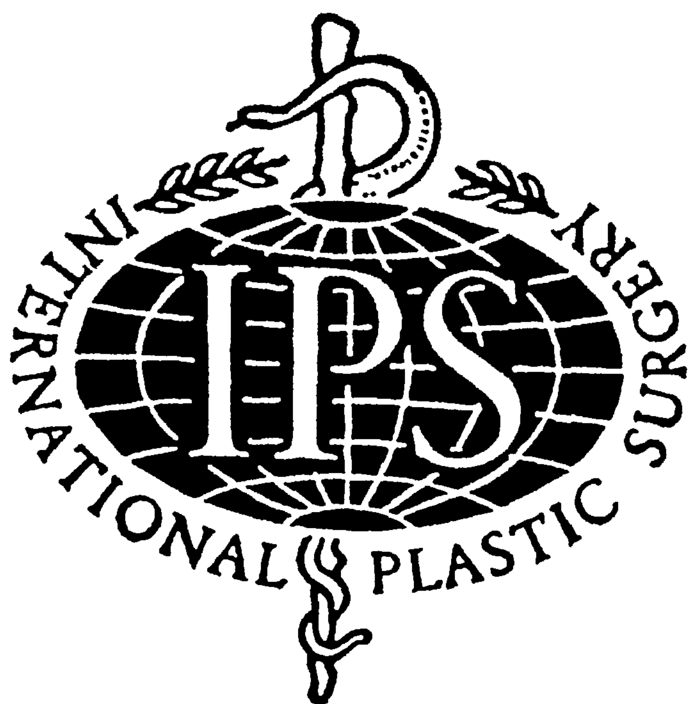
TRANSACTIONS OF THE INTERNATIONAL SOCIETY OF *Plastic Surgeons*



TRANSACTIONS OF THE INTERNATIONAL SOCIETY OF *Plastic Surgeons*

FIRST CONGRESS

Stockholm and Uppsala 1955

Edited by

Tord Skoog, M.D., *General Secretary of the Congress, in cooperation with* Robert H. Ivy, M.D., *and the Editorial Board of Plastic & Reconstructive Surgery*

Translations of abstracts into

French by Dr. Morel-Fatio, *Paris*
German by Professor Karl Schuchardt, *Hamburg*
Spanish by Dr. Mario Gonzalez Ulloa, *Mexico City*



THE WILLIAMS & WILKINS COMPANY

Baltimore • 1957

Preface

At the annual meeting of the Scandinavian Association of Plastic Surgeons held in Gothenburg in 1953 it was decided to propose to arrange an international congress of plastic surgery to be held in 1955. Personal invitations to participate in the Congress were sent to all plastic surgeons belonging to national associations in the speciality, and to countries without such an association invitations were extended to their health services.

The initiative to organize an international congress of plastic surgery was met with world-wide interest. Preliminary applications were filed by more than 300 plastic surgeons from 41 countries.

The Congress Program was planned to cover the whole field of plastic surgery, for it was felt that not until delegates from various countries had met should decisions be made on international meetings covering limited fields. It was also felt that the advent of the atomic age has given plastic surgeons an alarming responsibility in respect to the treatment of burns. It was therefore considered imperative that the program include, among the main subjects, the care of the burned. This view, it would seem, has been widely accepted.

This volume reports on the foundation of an International Society of Plastic Surgeons and presents the organization and scientific program of the International Congress of Plastic Surgery held in Stockholm and Uppsala, August 1st to 5th, 1955.

Sincere thanks are due to those who have contributed papers to this volume, to Dr D Morel-Fatio, Professor K Schuchardt and Dr M Gonzalez-Ulloa who were kind enough to volunteer in preparing respectively, the French, German and Spanish translations of the Summaries, and, above all, to Dr R H. Ivy and the Editorial Board of *the American Journal of Plastic and Reconstructive Surgery* whose indefatigable help and generosity in revising and publishing this volume have been invaluable.

Uppsala, May 1956

TORD SKOOG

Made in the United States of America

Library of Congress
Catalog Card Number
67-8326

less than five active members. The delegates are appointed by the national associations.

The Council meets in session in conjunction with the Congress to receive reports of the Executive Committee and to prepare propositions to be submitted to the General Assembly.

ART. 8

The General Assembly

The General Assembly consists of all Society members present. It meets at each Congress under the chairmanship of the President of the Congress. The General Secretary of the Society is likewise the Secretary of the General Assembly.

The General Assembly receives the report of the Executive Committee.

It elects the General Secretary, the Treasurer, and the Members of the Executive Committee.

It elects members to the Society.

It fixes membership fees.

It decides which country should be offered to organize the next Congress.

It decides upon any other propositions made by the Council or submitted by Society members through the General Secretary.

ART. 9

The Congress

The Congress is held every fourth year. The organization, the scientific program and the costs of the Congress rest entirely with the host country which also appoints the President of the Congress, committees, etc.

Preliminary information on the planned Congress should be sent personally to Society members at least one year before the Congress.

Vote and Rules

ART. 10

The vote in the General Assembly, the Council and the Executive Committee is by majority. For the Executive Committee, voting by correspondence shall be admissible.

The Statutes of the Society may be changed by a majority vote of the General Assembly. Notice of a suggested change should be given to the General Secretary at least three months before the General Assembly.

Transactions

ART. 11

The transactions and scientific presentations of the Society shall be published in English in co-operation with the Editorial Board of the Journal of the American Society of Plastic and Reconstructive Surgery.

Statutes

INTERNATIONAL SOCIETY OF PLASTIC SURGEONS

Purpose of the Society

ART 1

The purpose of the International Society of Plastic Surgeons is to promote plastic surgery both scientifically and clinically to further education and to encourage friendship between physicians in all countries

Membership

ART 2

The International Society of Plastic Surgeons has Society and Congress members

ART 3

Society members

Membership in the Society may be obtained by men and women specializing in plastic surgery or related fields Application for membership must be supported by the associations of plastic surgeons in the countries concerned or in the absence of such an association, by two plastic surgeons known to the Executive Committee Applications for membership should be received by the General Secretary of the Society at least one month before the opening of a Congress for approval of the Executive Committee before election by the General Assembly

Society members are entitled to take part in the Society's international congresses and to vote at its business meetings They pay a four year subscription to be fixed by the General Assembly

ART 4

Congress members

Congress members are (i) medical men and women who without being specialists in plastic surgery are interested in the Society's activities and (ii) relatives and friends accompanying Society members

Congress members may on application take part in the Society's activities excepting business meetings These members pay a fee for the Congress in which they take part. The fee will be fixed by the organization committee of each Congress

Organization

ART 5

The business of the Society shall be conducted by an Executive Committee a Council and the General Assembly

ART 6

Executive Committee

The Executive Committee shall consist of a General Secretary a Treasurer and seven members all appointed by the General Assembly for a period of four years and eligible for re-election.

The General Secretary and the Treasurer should preferably have their permanent residence in the same country

The purpose of the Executive Committee is to ensure the holding of Congresses to carry out the program decided upon by the General Assembly to report to the Council and to the General Assembly every fourth year and, in general to represent the Society between Congresses

Expenditure shall be authorized by the General Secretary The Treasurer's report shall be given to the General Assembly

ART 7

The Council

The Council of the Society shall consist of one delegate from each of the national associations of plastic surgeons, excluding those which have

Contents

Section I

Section II

Chapter I
BURNS

Officers of

THE INTERNATIONAL SOCIETY OF PLASTIC SURGEONS 1955–59

Honorary President

Sir Harold Gillies 140 Harley Street London W 1 England

General Secretary

Tord Skoog M D., Akademiska sjukhuset Uppsala Sweden

Treasurer

Karl-Erik Hogeman M D., Allmänna sjukhuset Malmö Sweden



Professor Truman G Blocker Jr U S A

Executive Committee

Truman G Blocker Jr. Professor University of Texas Galveston, Texas U.S.A

Francis Burian Professor Skrétova 8 Prague XII Czechoslovakia

Daniel Morel-Fatio M.D., 4 Rond Point de Longchamp Paris 16e France

Mario Gonzalez Ulloa M.D., Tuxpan 23 Zona 7 Mexico D.F., Mexico

Sir Archibald McIndoe, 140 Harley Street London W.1 England

Gustavo Sanvenero-Rosselli Professor Via Marchiondi 5 Milan Italy

Karl Schuchardt Professor Johnsallee 3 Hamburg 13 Germany

Chapter III

JAWS

Chapter IV

NOSE

Chapter II
CLEFT LIP AND PALATE

Chapter IX

BREAST AND ABDOMEN

Chapter X

GENITALS

A MALE GENITALS

B FEMALE GENITALS

Chapter XI

HAND

Chapter V

EYE

Chapter VI

EAR

Chapter VII

SCALP AND CRANIUM

Chapter VIII

OESOPHAGUS

Chapter IX

BREAST AND ABDOMEN

Chapter X

GENITALS

A MALE GENITALS

B FEMALE GENITALS

Chapter XI

HAND

Chapter XII

CLINICAL AND EXPERIMENTAL RESEARCH

A SKIN

B CARTILAGE AND BONE

Chapter XIII

MISCELLANEOUS

A FLAP REPAIRS

B MYELOMENINGOCELE LYMPHOEDEMA DERMAL ABRASION

C. MISCELLANEOUS

Chapter XIV

MOTION PICTURES

Section I

The Congress Organization

PATRON

His Majesty the King of Sweden

GUSTAF VI ADOLF

Honorary President

Sir HAROLD GILLIES, London, England

Honorary Committee

Sir Archibald McIndoe
East Grinstead, England

Georg Axhausen
Berlin, Germany

J Barrett Brown
St Louis, U S A

Francis Burian
Prague, Czechoslovakia

M Coelst
Brussels, Belgium

Claude Dufourmentel
Paris, France

Mario Gonzalez-Ulloa
Editor of Revista Latino Americana de Cirugia Plastica,
Mexico City, Mexico

Robert H Ivy
Editor of Plastic and Reconstructive Surgery,
Philadelphia, U S.A

Varaztad H Kazanjian
Boston, U S A

T Pomfret Kilner
Oxford, England

A Limberg
Leningrad, U S S R

Rainsford Mowlem
London, England

Allan Ragnell
Stockholm, Sweden

Gustavo Sanvenero-Rosselli
Milan, Italy

A B Wallace
Editor of British Journal of Plastic Surgery,
Edinburgh, Scotland

Jerome P Webster
New York, U S A



Mrs. and Professor Jerome P Webster U.S.A

Honorary Vice-Presidents

CLARENCE R. STRAATSMA
President of the American Association of Plastic Surgeons

WILLIAM G HAMM
President of the American Society of Plastic and Reconstructive Surgery

HÉCTOR MARINO
President of the Argentine Association of Plastic Surgeons

T POMFRET KILNER
President of the British Association of Plastic Surgeons

A. ROSS TILLEY
President of the Canadian Society of Plastic Surgeons

RAUL CAÑIZARES
President of the Cuban Association of Plastic Surgeons

CAREL F KOCH
President of the Dutch Association of Plastic Surgeons

JACQUES W MALINIAC
President of the Foundation of the American Society of Plastic and Reconstructive Surgery

MAURICE AUBRY
President of the French Association of Plastic Surgeons

KARL SCHUCHARDT
President of the German Association for Surgery of the Face and Jaws

WOLFGANG ROSENTHAL
President of the Society for Stomatology Berlin Germany E.Z

GUSTAVO SANVENERO-ROSSELLI
President of the Italian Association of Plastic Surgeons

JOSÉ REBELO NETO
President of the Latin American Society of Plastic Surgeons

MARIO GONZALEZ ULLOA
President of the Mexican Association of Plastic Surgeons

ALEXANDER VISHNEVSKY
Director of the Surgical Institute U.S.S.R Medical Academy

IVO ČUPAR
Representative of the Council of the Academies Yugoslavia






Honorary President Sir Harold Gillies, England (upper left), President Per Erik Aschan, Finland (upper right), General Secretary Tord Skoog, Sweden (lower left), Treasurer Karl-Johan Grenabo, Sweden (lower right)



Mrs and Professor Jerome P Webster U.S.A

Honorary Vice-Presidents

CLARENCE R. STRAATSMA
President of the American Association of Plastic Surgeons

WILLIAM G HAMM
President of the American Society of Plastic and Reconstructive Surgery

HÉCTOR MARINO
President of the Argentine Association of Plastic Surgeons

T POMFRET KILNER
President of the British Association of Plastic Surgeons

A. ROSS TILLEY
President of the Canadian Society of Plastic Surgeons

RAUL CAÑIZARES
President of the Cuban Association of Plastic Surgeons

CAREL F KOCH
President of the Dutch Association of Plastic Surgeons

JACQUES W MALINIAC
President of the Foundation of the American Society of Plastic and Reconstructive Surgery

MAURICE AUBRY
President of the French Association of Plastic Surgeons

KARL SCHUCHARDT
President of the German Association for Surgery of the Face and Jaws

WOLFGANG ROSENTHAL
President of the Society for Stomatology Berlin, Germany E.Z

GUSTAVO SANVENERO-ROSSELLI
President of the Italian Association of Plastic Surgeons

JOSÉ REBELO NETO
President of the Latin American Society of Plastic Surgeons

MARIO GONZALEZ ULLOA
President of the Mexican Association of Plastic Surgeons

ALEXANDER VISHNEVSKY
Director of the Surgical Institute U.S.S.R Medical Academy

IVO CUPAR
Representative of the Council of the Academies Yugoslavia

Summary of the Program

SCIENTIFIC PROGRAM

MONDAY, AUGUST 1st

8 30 a m – 5 30 p m — Registration in the Concert Hall, Stockholm

7 00 p m — Reception and cocktails in the Town Hall, Stockholm (By invitation of the City Council)

TUESDAY, AUGUST 2nd

9 30–10 00 a m — Opening Ceremony in the Concert Hall

10 15–12 00 noon — Session (Research)
Chairman Aschan, P E, Finland
v Chairman Mowlem, R, England
Secretary Hogeman, K-E, Sweden

2 00–5 00 p.m — Session (Cleft lip and palate)
Chairman Kilner, T P, England
v Chairman Trauner, R, Austria
Secretary Schjelderup, H, Norway

WEDNESDAY, AUGUST 3rd

9 00–12 00 noon Room A — Session (Burns, Oesophagus)
Chairman Ragnell, A, Sweden
v Chairman Tilley, R A, Canada
Secretary Fogh-Andersen, P, Denmark

9 00–12 00 noon Room B — Session (Jaws, Nose, Eye, Ear)
Chairman Schuchardt, K, Germany
v Chairman Dingman, R O, U S A
Secretary Soivio, A Finland

2 00 p m — Members, one from each country represented at the Congress, discussed the formation of an International Society of Plastic Surgeons

5 00 p m — Boat trip to Drottningholm Palace, Royal summer residence, including a performance in the 18th-century Palace theatre Informal Congress Dinner (By invitation of AB Astra)

THURSDAY, AUGUST 4th

8 30 a.m — Bus trip to Uppsala

10 00–11 00 a m — Session (Burns)
Chairman Malbec, E F, Argentina
v Chairman Recamier, J, France
Secretary Hogeman, K-E, Sweden

11 00–12 00 noon — Visit to the old anatomy theatre at the Gustavianum, famous for its original architecture and the man who designed it—Olof Rudbeck, the discoverer of the lymphatic vessels (A pamphlet on the history of the theatre was given to the members)

12 15 p m — Luncheon at Uppsala Castle

CONGRESS OFFICERS

President

Per Erik Aschan Helsinki Finland

General Secretary

Tord Skoog Uppsala Sweden

Treasurer

Karl-Johan Grenabo Stockholm Sweden

Scientific Program Committee

Tord Skoog Uppsala Sweden
Poul Fogh Andersen Copenhagen Denmark
Karl-Erik Hogeman Malmö Sweden
Halfdan Schjelderup Bergen Norway
Atso I Soivio Helsinki Finland

Executive Committee

Tord Skoog Karl-Johan Grenabo, Mrs Karin Pravitz

Editor of the Proceedings

Tord Skoog in co-operation with the Editors of *Plastic and Reconstructive Surgery*

Auditors

Snorre Hallgrimsson Reykjavik, Iceland
Wilhelm Loennecken Oslo Norway

Ladies' Committee

Mrs Brita Bäckdahl
Mrs Karin Engström
Mrs Maj Grenabo
Mrs Gertrud Hogeman
Mrs. Karin Pravitz (in charge)
Mrs Eivor Ragnell
Mrs Ann-Charlotte Skoog
Mrs Lissie Velander

Congress Bureau

In charge Mrs Karin Pravitz

Sponsors

The organization of the Congress was made possible thanks to the generous financial aid received from the following Swedish institutions manufacturers and insurance companies

The Swedish Government
The City Council of Stockholm
The University of Uppsala
Almqvist & Wiksells Boktryckeri AB
AB Astra
AB Ferrosan
Folksam
AB C A Heljestrand
AB Kabi
Kirurgiska Instrument Fabrik AB (KIFA)
Kirurgiska Instrumentfirman Axel Ericsson
Kooperativa Förbundet
AB Leo
AB Pfizer
AB Pharmacia
AB Stille-Werner
Thulebolagen
AB Vitrum

THURSDAY, AUGUST 4th (Uppsala)

Departure by bus from Stockholm. On their arrival in Uppsala, the participants formed several groups with the same program but a different time schedule for each Sightseeing in Uppsala and "Old Uppsala." Visit to Uppsala Ekeby, a leading Swedish ceramics manufacturer Exhibition of modern Swedish glass and ceramics Exhibition of ancient medical books
Luncheon in Uppsala Castle
Light refreshments at the house of the General Secretary and Mrs Skoog
Tea in the University Building
(Thursday's Program—by invitation of AB Pharmacia)

FRIDAY, AUGUST 5th

ALTERNATIVE I

Visit to Millesgården, home and gardens of Carl Milles, the sculptor
Lunch at the restaurant "Foresta "
Visit to Nordiska Kompaniet, Stockholm's largest department store (Textiles, furniture, glass, etc).

ALTERNATIVE II

Visit to Skansen, Stockholm's open-air museum and zoological gardens
Lunch at "Solliden," Skansen
Visit to Karolinska Sjukhuset, Sweden's largest State hospital

ALTERNATIVE III

Bus trip to 17th-century Skokloster castle, on a bay of Lake Malaren Rich collections of furniture, portraits, tapestries and weapons
Lunch at Skokloster Inn
Banquet at Stockholm Town Hall Dancing
(Friday's Program, except for the banquet, was by invitation of AB Kabi and AB Vitrum)

2.00–5.00 p.m. University Building — Symposium on Burns
Chairman Blocker Jr T G., U.S.A
v Chairman Jackson D M., England
Secretary Skoog T., Sweden

5.00 p.m — Tea at the University Building

6 15 p.m — Return by bus to Stockholm (The Uppsala program was sponsored by AB Pharmacia)

FRIDAY AUGUST 5th

9.00–12.00 noon Room A — Session (Miscellaneous)
Chairman González Ulloa M., Mexico
v Chairman Dupertuis S M., U.S.A.
Secretary Soivio A., Finland

9.00–12.00 noon Room B — Session (Hand)
Chairman Littler J W., U.S.A
v Chairman Moberg, E., Sweden
Secretary Schjelderup, H., Norway

2.00–4.00 p.m Room A — Session (Genitals Breast)
Chairman McIndoe A., England
v Chairman Adams W M., U.S.A
Secretary Fogh-Andersen, P Denmark

4.00–5 00 p.m Room A — General Assembly
Chairman Aschan, P E., Finland
Secretary Skoog T., Sweden

7 00 p.m. — Banquet at Stockholm Town Hall Dancing

SUNDAY, AUGUST 7th

Post-congress excursion, by boat to the Stockholm Archipelago

The motion pictures were shown separately in two simultaneous non-stop performances.

LADIES' PROGRAM

MONDAY AUGUST 1st

Reception and cocktails in the Town Hall Stockholm

TUESDAY AUGUST 2nd

Opening Ceremony in the Concert Hall.

ALTERNATIVE I

"Social day Visits to modern settlements, schools and social welfare institutions providing a survey of modern Swedish life
Lunch at the "Nackanäs Värdshus
Water-bus around the Djurgården island. Visit to the art collections of the late Prince Eugen at Waldemarsudde.

ALTERNATIVE II

Sightseeing Conducted walk through the "City between the Bridges" (the old town) visit to the Royal Palace and Riddarholmskyrkan (Sweden s Pantheon.")
Lunch at the restaurant "Stromparterren "
Visit to the National Art Gallery

ALTERNATIVE III

By bus to country houses and farms demonstration of Swedish handicraft. Lunch at Sigtuna (Tuesday's Program—by invitation of AB Leo)

WEDNESDAY AUGUST 3rd

Free for private arrangements. No scientific sessions scheduled after 12 noon
In the evening boat trip to Drottningholm Palace. Performance in the 18th-century Palace theatre.
Informal Congress dinner at Skansen
(Wednesday's Program—by invitation of AB Astra.)

OPENING OF THE CONGRESS

by Arthur Engel, M. D.
Director General of the Royal Swedish Health Services

Mr President, Ladies and Gentlemen,

I am indeed very pleased and very proud to address the First International Congress of Plastic Surgery in the name of the Swedish medical authorities and to wish all its members and their families very welcome to this country

The need for international cooperation in the field of medicine is certainly always of great importance but it seems to me that this need is most urgent and the work likely to be most fertile when cooperation concerns highly specialized problems and the field of research is a virgin one Plastic operations have been undertaken by surgeons in all times and you will find some highlights in the development of this particular field at the exhibition of 100 books from the Waller Collections which is arranged for this congress Even taking this into consideration plastic surgery must be said to be a new independent branch of practical surgery and of scientific research and a highly specialized one too

Activities of modern time as war—specially the atomic warfare—, the alarming and continuously increasing figures of traffic accidents all over the world, the injuries of a vocational character e g in industry have focused the attention of health administrators on the importance of plastic surgery

The modern medical care aims at the most complete recovery of the sick or injured, at a result satisfying from both an anatomical and a functional point of view The philosophy of rehabilitation underlines the functional aspects and claims the most complete restitution of the sick or disabled individual in regard to his social functions Reconstructive and cosmetic surgery has to play an important role in the process of rehabilitation The psychological effects and social importance of the cosmetic results should not be underestimated in this connection

The Royal Swedish Medical Board, which I am representing, recognizing the role of plastic surgery, has in collaboration with representatives of this speciality, drafted a programme for the future organization of plastic surgery as a hospital function in this country This plan includes special departments and out-patient services at six regional hospitals—highly specialized hospitals, each serving a population of about 1 million inhabitants The co-operation with other specialized branches of surgery, orthopedic surgery, dental surgery, radiotherapy and so on we expect to become very fruitful We also consider that plastic surgery services will effectively support the extensive rehabilitation organization which is planned for every county central hospital —A Swedish county has about 250,000 inhabitants Plastic surgery is thus of current interest to the health administration of this country I have mentioned this in order to explain the special interest we take in this congress

It is true that this congress is a scientific one The implications of science will, however, very soon reach the organizational level The inspiring effect of this congress on the medical profession as a whole will be powerful, far-reaching and long lasting I hope its reactions will in due time also reach the local administrative authorities and promote the development of plastic surgery at our hospitals

The more than one hundred and fifty contributions to the programme of this congress covering vast fields of plastic surgery and experimental medicine is really impressing, giving an idea of the activity of plastic surgery all over the world I will not go into details and only say that I am sure that the few days set aside for the congress will be very busy for you but certainly filled by very interesting work

I sincerely wish the First International Congress of Plastic Surgery all success and I

The Opening Ceremony

ADDRESS OF WELCOME

by Dr P E. Aschan
President of the Congress

Ladies and Gentlemen, Distinguished Guests

We have to-day come together from forty different countries We are assembled in order to exchange opinions within the field of plastic surgery On behalf of the Scandinavian Association of Plastic Surgeons I cordially welcome you all

His Majesty the King of Sweden the patron of this congress will not be able to attend personally The Swedish Government is represented by the Director of the Royal Swedish Health Services Director General Engel I wish to welcome him

May I on this occasion in particular address our President of Honour Sir Harold Gillies whom we all know as a great pioneer of this field It is a pleasure for us to see him, the grand old man of plastic surgery with us to-day

Plastic surgery is a part of medicine with traditions reaching far back in time We have examples of operations of this kind from the very beginning of recorded time This proves how much importance mankind has always attached to the healing of defects and disfiguring wounds The development however did not proceed further until the discovery of asepsis and we ourselves live in the happy age when we can work with the support of antibiotics blood transfusions and new efficient instruments inter alia for skin grafting The modern methods of anaesthesia and intubation are of invaluable use to us and to the advantage of our patients

Consequently plastic surgery has made great progress during the last twenty or thirty years. The work done has only been possible thanks to men with enterprise and initiative We must thank these men for the modern development of plastic surgery We are happy to see so many representatives of them with us to-day

I cannot here omit to mention the problems of burns It has become a question of greatest importance to plastic surgeons The use of the modern shock treatment saves the lives of a greater number of patients than before This presupposes also more frequent and larger operations by the plastic surgeons This whole problem is the subject of intense research which can be seen by the large scope it has been given at this congress There is of course a serious reason for this research I am thinking of those burns and radiation injuries which may be caused in an atomic war I sincerely hope that we will be spared anything like that yet I want to stress that we physicians have to be prepared to counteract and to heal its consequences.

As the Scandinavian Association of Plastic Surgeons has now taken the initiative in calling together the First International Congress of Plastic Surgery it may seem bold to you that our small association has taken this step This shows however what a great importance we here in the North attach to a good and profitable collaboration, in particular in the field of medicine In our special field of plastic surgery we Scandinavians have indubitably been on the receiving end We have tried to collect experience not only within our own circle but have also eagerly kept contact with distinguished colleagues in other countries

international is even more justifiable, now that we have the pleasure of welcoming our plastic colleagues from the North, the West, the South and especially those from the East who by the good plastic principle of restoring the normal to its normal position have found a way to come and join us in our crusade for better surgery, and as a further link in the good-will of all peoples

I am sure you will all join in wishing "våra svenska vänner stor framgång med Kongressen"

And so to work

(The Opening Ceremony took place in the Concert Hall, Stockholm Before and after the Ceremony Scandinavian music was played on the Concert Hall organ.)

extend my good wishes to your future international cooperation. I am convinced that your proceedings will be fruitful from the scientific point of view and will take place in the best international atmosphere and bring you together personally

With these few words of appreciation and with a wish for good luck I declare this First International Congress of Plastic Surgery opened

ADDRESS BY THE HONORARY PRESIDENT

Sir Harold Gillies

Mr President, Dr Engel, Ladies and Gentlemen,

May we consider for a moment the development of plastic surgery and the new phase emphasised by this congress this astonishing mélange of plastic surgeons all engaged in an endeavour to alleviate the physical and mental disfigurements of the human race Within us all there is an overwhelming urge to change something ugly and useless into some other thing more beautiful and more functional When, however we look around us in Sweden everything and everybody seems so lovely there surely can be little need for plastic surgery in this land of beauty

It was this urge that made a few surgeons in every country concentrate on the repair of the ghastly war wounds of 1914 1918 and again 1940-1945 In between these conflicts the experiences gained were added to the techniques already in favour for the treatment of civil accidents developmental defects and for results of disease of the surgeon s knife. Corrective surgery with all the psychic relief it can give, continued its steady progress The late deformities of the burned patient came to the plastic table and it was not long before the early treatment of a burn was absorbed as part of our duty

Finally injuries and deformities of the hand have stimulated a wide group of experts to concentrate on these conditions. During these 20 years great names were arising and clinics started in all continents of the world.

Yet when one remembers what the ancients and the not-so-ancient, achieved in their plastic surgery one is a little tempted to whisper— photography " More seriously the immense increase in the number of surgeons practising our art and the mass scientific effort applied to it made it imperative to have such an exchange of views as this congress will afford.

I am sure I speak for all present in thanking the Scandinavian Society of Plastic Sur *geons for having conceived this blond child and for bringing it* redheaded *maturity*— perhaps I should say bald headed We express our gratitude to you for this invitation and we humbly express our appreciation of His Majesty s Patronage.

We cannot fail to pay tribute to the efficiency and colossal work of the congress officers and trust that our deliberations will reach the high standard they have set. Particularly and personally I would like to address a few words of appreciation to the pioneer work of our friend Dr Allan Ragnell in establishing plastic surgery in Sweden and setting such a high standard of artistic work learned perhaps at the feet of Professor Kilner

To Dr Tord Skoog we all have especial admiration and affection and now offer him and his noble band of organizers not forgetting the ladies, our most sincere congratulations.

Although there were several international meetings before the last war the world

hope that there will be a great future for the Foundation Thank you

Professor T P Kilner Great Britain

Mr Chairman, I am only going to keep you for a moment I want to say how much I regret that those members of my own unit in Oxford, who have accepted and been delighted with the hospitality provided by the Foundation in America, are not here to speak for themselves to-day Two of those who work with me have been over to America on a Foundation scholarship, most of them have, I am sure, derived enormous benefit, and I should like to speak for them in conveying our thanks to the Foundation and to all those who help the Foundation, because, after all, the Foundation would not exist unless it had its contributory members who have given so much to our people

Invitation to the International Conference on Transplantation of Tissues in 1956

Dr J M Converse, USA

Mr Chairman, ladies and gentlemen,

It is superfluous to emphasize to a group like this the importance of research in our field At many of the centres at the present time research is going along hand in hand with the treatment of patients But research in the field of transplantation of tissues requires the co-operation of many workers, such as biologists, surgeons, pathologists and others In order to stimulate interest in this field we organized two years ago, under the auspices of the New York Academy of Sciences, an international conference on transplantation of tissues, which was very successful And as a result of this conference research in the field of tissue transplantation has been started at many centres

I wish to announce to-day that another conference is being organized for the 2nd and 3rd of February of next year We have at the present time coming to the conference, workers from England and from France We shall appreciate it if any of you have material that you would like to present at this meeting I want to emphasize that the material presented is on a very basic level Or, if you know of workers in this field who have contributions to make, please write to me

Thank you very much

Founding of the International Society of Plastic Surgeons

Chairman P E Aschan, Finland

On Wednesday, August 3rd the Program Committee of this Congress arranged an informal meeting at which one person from each country represented at this Congress was present The object of that meeting was to discuss the desirability of founding an International Society of Plastic Surgeons All present agreed that such a society should be founded A set of rules and regulations for an International Society was presented by the General Secretary and after discussion and modifications was unanimously adopted for presentation to this Assembly Printed copies of these proposed statutes have been distributed to you this morning The General Secretary will now read them and make some comments

General Secretary T Skoog, Sweden

Mr President, ladies and gentlemen,

You have to-day received propositions for Statutes for an International Society. These are of course no definite Statutes but intended to serve as a basis for discussion This draft is based on statutes of other International Medical and Scientific Societies It is more detailed than many but less detailed than some

The speaker then read the proposed statutes (See p vi), adding the following comments

Art 3, (Society Members)

This article should allow every plastic surgeon, working in any country, to get full membership in the Society It is the practice in most national societies that not only plastic surgeons but also those who are working in related fields may obtain membership, and we thought that the same should apply to the International Society It was the general feeling that we have to be very liberal in considering requests for membership in the International Society since this organization does not author-

The General Assembly

Chairman: **P E. ASCHAN, FINLAND**

Secretary: **T SKOOG, SWEDEN**

Announcements concerning the Foundation of the American Society for Plastic and Reconstructive Surgery

Dr W M Adams USA

Mr President I am very sorry to report that Dr Malinne was too ill to come to report on the Foundation of the American Society of Plastic and Reconstructive Surgery and asked me to speak to you on his behalf Since this organization has recently undergone a reorganization which is still in progress we have the new President of the Foundation here with us Dr Clarence Straatsma. I think it much more appropriate that we hear from Dr Straatsma I am sure he can do it much better than I

Dr C Straatsma USA

Mr President members and guests

When I visited Dr Malinnac he asked me to convey his greetings to this Congress and wish it much success I think I am sure in saying that neither he nor any of us could possibly foresee the great success that this Congress has become. I think everyone of us has been impressed with the way it has been run and the enthusiasm with which things have been conducted.

I thought it would be appropriate at this time to say one or two things about the objectives and activities of the Foundation of the American Society of Plastic and Reconstructive Surgery I presume that most of the members here are familiar with the aims of the Foundation as full reports of its progress since 1950 were published in the American Journal of Plastic and Reconstructive Surgery The constitution and by laws were adopted in 1949 and the Foundation was incorporated in New York State that same year The Foundation s main objectives are to carry out a program of wide professional inter relationship and to establish scholarships for study and training in plastic surgery and to acknowledge outstanding contributions in this field An annual scholarship contest has served to stimulate research and interest among the younger men in the field it provides a medium for recognition of ability and for bestowal of moral and financial encouragement to those eager for such accomplishment and I might add that this year we have been able to offer a thousand dollars first award and a 750 dollars second award for the carrying on of this work. As you know there are 43 different services who have consented to have these men come to see them for periods varying from 4 days to 4 weeks When these men visit these particular services these services take care of their board and room so that the main expense they have is travel expense from one service to another And some of the men have finished their period of 3 month in another case of 6 months and have a little money left at the end of that period. And we certainly want to thank all the various clinics and services who entertained these people took good care of them and treated them a honoured guests and we certainly appreciate the co-operation of all the various people here and we do hope that we will have the blessing of this new Congress so that this work may continue Thank you!

Dr B Johanson Sweden

As one of the scholars who have been supported by the Foundation in America I want to take this opportunity to thank the Foundation for this great opportunity given to all the young plastic surgeons of the world. I was very impressed by the help you get when you come over to America as a scholar and I certainly

hope that there will be a great future for the Foundation Thank you

Professor T P Kilner, Great Britain

Mr Chairman, I am only going to keep you for a moment I want to say how much I regret that those members of my own unit in Oxford, who have accepted and been delighted with the hospitality provided by the Foundation in America, are not here to speak for themselves to-day Two of those who work with me have been over to America on a Foundation scholarship, most of them have, I am sure, derived enormous benefit, and I should like to speak for them in conveying our thanks to the Foundation and to all those who help the Foundation, because, after all, the Foundation would not exist unless it had its contributory members who have given so much to our people

Invitation to the International Conference on Transplantation of Tissues in 1956

Dr J M Converse, USA

Mr Chairman, ladies and gentlemen,

It is superfluous to emphasize to a group like this the importance of research in our field At many of the centres at the present time research is going along hand in hand with the treatment of patients But research in the field of transplantation of tissues requires the co-operation of many workers, such as biologists, surgeons, pathologists and others In order to stimulate interest in this field we organized two years ago, under the auspices of the New York Academy of Sciences, an international conference on transplantation of tissues, which was very successful And as a result of this conference research in the field of tissue transplantation has been started at many centres

I wish to announce to-day that another conference is being organized for the 2nd and 3rd of February of next year We have at the present time coming to the conference, workers from England and from France We shall appreciate it if any of you have material that you would like to present at this meeting I want to emphasize that the material presented is on a very basic level Or, if you know of workers in this field who have contributions to make, please write to me

Thank you very much

Founding of the International Society of Plastic Surgeons

Chairman P E Aschan, Finland

On Wednesday, August 3rd the Program Committee of this Congress arranged an informal meeting at which one person from each country represented at this Congress was present The object of that meeting was to discuss the desirability of founding an International Society of Plastic Surgeons All present agreed that such a society should be founded A set of rules and regulations for an International Society was presented by the General Secretary and after discussion and modifications was unanimously adopted for presentation to this Assembly Printed copies of these proposed statutes have been distributed to you this morning The General Secretary will now read them and make some comments

General Secretary T Skoog, Sweden

Mr President, ladies and gentlemen,

You have to-day received propositions for Statutes for an International Society These are of course no definite Statutes but intended to serve as a basis for discussion This draft is based on statutes of other International Medical and Scientific Societies It is more detailed than many but less detailed than some

The speaker then read the proposed statutes (See p vi), adding the following comments

Art 3, (Society Members)

This article should allow every plastic surgeon, working in any country, to get full membership in the Society It is the practice in most national societies that not only plastic surgeons but also those who are working in related fields may obtain membership, and we thought that the same should apply to the International Society It was the general feeling that we have to be very liberal in considering requests for membership in the International Society since this organization does not author-

ize persons to practise plastic surgery but is meant to act for the promotion of our science exchange of information between colleagues in various countries and to deal with research problems which can suitably be tackled on an international basis On the other hand this Society must of course be in complete harmony with existing national societies and must in no way interfere with their activities. Therefore the selection of members is left entirely to the national organizations of plastic surgeons

Art 6 (Executive Committee)

The intention of this article is to provide the simplest possible organization to enable members in all countries to keep in contact and to be represented in the Society s Executive

The election of members to the Executive Committee should be without reference to nationality and it is sincerely hoped that no questions of nationality will be involved The Executive Committee members are elected by the General Assembly and in the future the candidates will be nominated by the Council (see Art. 7) Under this provision each country will have one vote in the selection of candidates.

The number of Executive Committee members has been proposed deliberately to be seven so that with the Secretary General eight main regions or language areas may be represented as follows

(1 and 2) Two English-speaking groups (one member each from the British Commonwealth and from the United States) (3) French (4) German (5) Italian (6) Scandinavian (7) Spanish (8) Slavic.

As plastic surgery develops in other major language areas these will of course have to be included.

Art 7 (The Council)

In the preliminary discussion of this article it was agreed that the requirement for a national organization to have at least 5 active members in order to be represented in the Council was justified. It was thought that this article might help to promote the development of national organizations

Art 8 (The General Assembly)

You may note that in contrast to the practice encountered in many international societies no provision is made for an office of President of the Society This is because experience has shown that practical difficulties may arise when there are two Presidents one of the Society and one of the Congress Whoever is entrusted to be the President of Congress will thus act as the President of the Society at that time

Art 9 (The Congress)

The proposed interval of 4 years between Congresses was decided on after considerable discussion of the various advantages and disadvantages of meetings at short or long intervals.

Art 11 (Transactions)

It was felt unanimously that the generous offer of the Editorial Board of the *American Journal of Plastic and Reconstructive Surgery* to co-operate in publishing the papers read at the Congresses should be gratefully accepted. I am sure everybody will realize the immense value to have the Transactions started as a continuous series and published in the same way for congresses to come

The members representing 40 countries who discussed these Statutes chose the English language for practical reasons. It is a fact that the vast majority of plastic surgeons read and understand English whereas any of the other languages even those used by large populations, will hardly be understood by more than a comparatively small minority English therefore seems to be the only practical choice

Professor P Kilner Great Britain

I should like to speak in general terms on the whole proposition. Is that in order? It would please me very much if I were able at this moment to advance any scientific evidence in support of the relationship of hasty conception to congenital deformity but I am quite certain that in the formation of associations of men and women hasty conception does lead to difficulties later on. And although I am enormously impressed by all the hard work that has gone to the formation of this particular congress, and which is obviously going towards the making of future successful congresses, I feel that this is being rather hastily conceived. I am a little troubled about Dr Skoog's use of the words representatives and delegates because the As-

sociation of which I am at present the President, the British Association of Plastic Surgeons, has appointed no delegate and no representative to discuss this question on this occasion, and I feel, and I think those members of the Council of my Association who are present will feel, that it would be quite wrong for us to go back to Great Britain with anything more than suggestions, and not certainly with a fait accompli I, personally, doubt the necessity for forming an International Society I agree with my whole heart to the advantages of having international congresses, but some members who are here may not know, may not have heard, that in the years 1936, 1937 and 1938 it did prove possible to establish an European International Congress, meeting on each of these occasions satisfactorily, without the formation of what must prove to be a somewhat expensive society And I mention these things, and I do hope that the General Secretary will realize that I am full of admiration for all that has gone to this congress and to the future congresses,—I mention them merely as warnings that we should proceed, perhaps, a little more carefully and a little more constitutionally

Mr R Mowlem, Great Britain

Mr President, ladies and gentlemen

A delegate is one possessing authority from his own organization to take action As far as I am aware none of us here has that authority from our National Associations, but it would appear that we are asked to vote in such a way that we pass the entire responsibility and the cost of a congress to the organization for plastic surgery or related subjects in a given country I cannot think that there is any power whatever within this body to tell the American Association, the French Association, the Italian Association, the British Association, or any other association, that, on such and such a year, that association will be responsible for organizing a congress I would suggest, Sir, that these very valuable Statutes be sent back from this meeting to each of the individual associations for further comments We would not need, and it would be highly undesirable, as our very competent Secretary has pointed out, to waste four years But it would be preferable to spend at least part of that four years in digesting this problem rather than suffering from indigestion for the rest of our lives And I would suggest, Sir, very seriously, that this matter is too big, too complicated, has too many ramifications, to be solved in half an hour or three quarters of an hour now, however willing we may be to do it.

Dr G Aufricht, USA ·

Mr Chairman, members of this newly organized society We all witnessed here one of the most successful meetings we have ever attended Up to the point when there were no particular rules, we did not know anything about the Statutes which were presented to us here Not knowing anything about particular delegates, laws, everything went just wonderfully I personally would vote and ask for membership, with a vote of confidence, that that organization which started this wonderful meeting and has suggested future congresses for the purpose expressed in the first article—for further education and to encourage friendship among physicians in all countries—we should vote full confidence, and a small group should continue to lead the laws, the purpose, and the moulding of this organization And let us not bog it down with rules and regulations

The General Secretary, in replying to the above statements, pointed out that it would be the most practical procedure to have an International Society founded now that plastic surgeons had come together from more countries than ever before These surgeons and the authority they embodied, whether or not they were delegates in the technical sense, were in fact the only persons one could think of to create an international society of this kind The General Secretary added that the formation of an International Society was announced, in a circular issued six months prior to the opening of the Congress, to be the subject of discussion There would be little use in having the matter referred back now that so many had responded to that invitation The experience made during the preparatory work for the present Congress had clearly shown that some sort of statutes would greatly facilitate the organization of the next Congress, notably with regard to the delicate question of selecting Congress members among the applicants

Dr C Dufourmental France spoke in favour of adopting the Statutes but opposed the use of English as the official language He suggested that this was an unnecessary provision which would not be favoured by his colleagues in France.

However, in response to the Chairman s question the use of English was favoured by a large majority vote

Following this discussion a vote was passed by a large majority to found an International Society of Plastic Surgeon The Statutes were adopted by a majority vote

For the full text of the Statutes as amended by The General Assembly see p vi The amendments made were as follows

Art 1 Delete the words *in practice* and substitute *clinically*

Art 2, Delete the words *Ordinary and Congress* and substitute *Society and Congress*

Art 3 Delete the word *physicians* and substitute *men and women*

Election of Officers

Honorary President Sir Harold Gillies England

General Secretary Tord Skoog M D Sweden

Treasurer Karl-Erik Hogeman M.D., Sweden

Executive Committee Truman G Blocker Jr., Professor U.S.A

Francis Burian Professor Czechoslovakia

Daniel Morel Fatio M D., France

Mario Gonzalez Ulloa M D., Mexico

Sir Archibald McIndoe England

Gustavo Sanvenero-Rosselli Professor Italy

Karl Schuchardt Professor Germany

Membership fee

The Assembly voted the Society membership dues to be 100 Sw crowns or equivalent for the next four year period.

Future Congresses

The Assembly extended an invitation to the British Association of Plastic Surgeons to hold the next Congress of the International Society in England in 1959 Professor T P Kilner President of the British Association in his reply stated that after consulting his Association he would notify the Society whether it would be possible to accept the invitation.

The Italian Association of Plastic Surgeons was invited to hold the Congress in Italy in case the reply from the British Association was in the negative and this offer was accepted.

A proposal that the third Congress should be held in the United States in 1963 was voted as a preliminary decision pending the confirmation of the members of the American Society of Plastic and Reconstructive Surgery

Emblem of the Society

A proposal that the Emblem used at the present Congress should be the emblem of the Society was passed by the Assembly (This emblem is figured on the cover of this volume)

The Chairman, in closing the General Assembly presented the International Society of Plastic Surgeons with the mallet used during the Congress and the Congress Scroll In the hope that England would be the next host country of a Society Congress these were entrusted to Sir Harold Gillies and Professor Kilner for the next four year period.

EXHIBITIONS

Exhibition of Ancient Medical Books

An exhibition at the Gustavianum, Uppsala, of one hundred ancient medical books from the Waller Collection of the University Library illustrated important steps in the development of medical science with special reference to plastic surgery An exhibition catalogue printed for the Congress was presented to the members (Copies of the catalogue are still available)

Tagliacozzi's Instruments

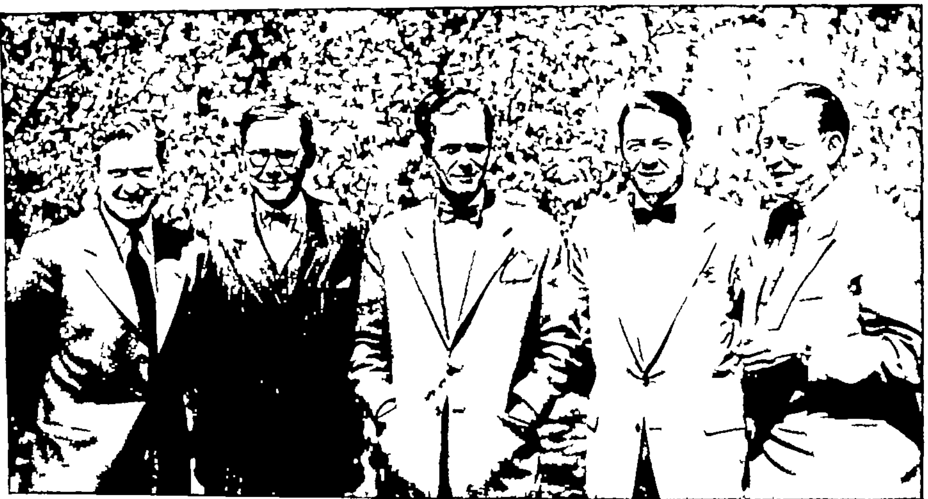
By courtesy of Professor G Sanvenero-Rosselli, Milan, the instruments used by Gasparo Tagliacozzi were exhibited

Commercial Exhibitions

Exhibitions of surgical instruments and current literature related to plastic surgery were arranged during the Congress

Countries Represented at the Congress

Argentina
Australia
Austria
Belgium
Brazil
British West Indies
Canada
China
Cuba
Czechoslovakia
Denmark
Egypt
Finland
France
East-Germany
West-Germany
Great Britain
Greece
Hungary
Iceland
Ireland
Israel
Italy
Mexico
Netherlands
New Zealand
Norway
Poland
Portugal
Spain
Sweden
Switzerland
Turkey
Union of South Africa
United States of America
Uruguay
U S S R
Venezuela
Yugoslavia



The Program Committee, Tord Skoog Sweden Halfdan Schjelderup Norway Poul Fogh Andersen Denmark Karl Erik Hogeman Sweden and Atso Soivio Finland



Mrs and Dr P E Aschan, Lady and Sir Harold Gillies In second row Mrs and Professor G Steinhardt, and Mrs and Professor K Schuchardt, West-Germany



Mrs E Aschan, Sir Archibald McIndoe, Lady McIndoe and Professor V H Kazanjian, U S A



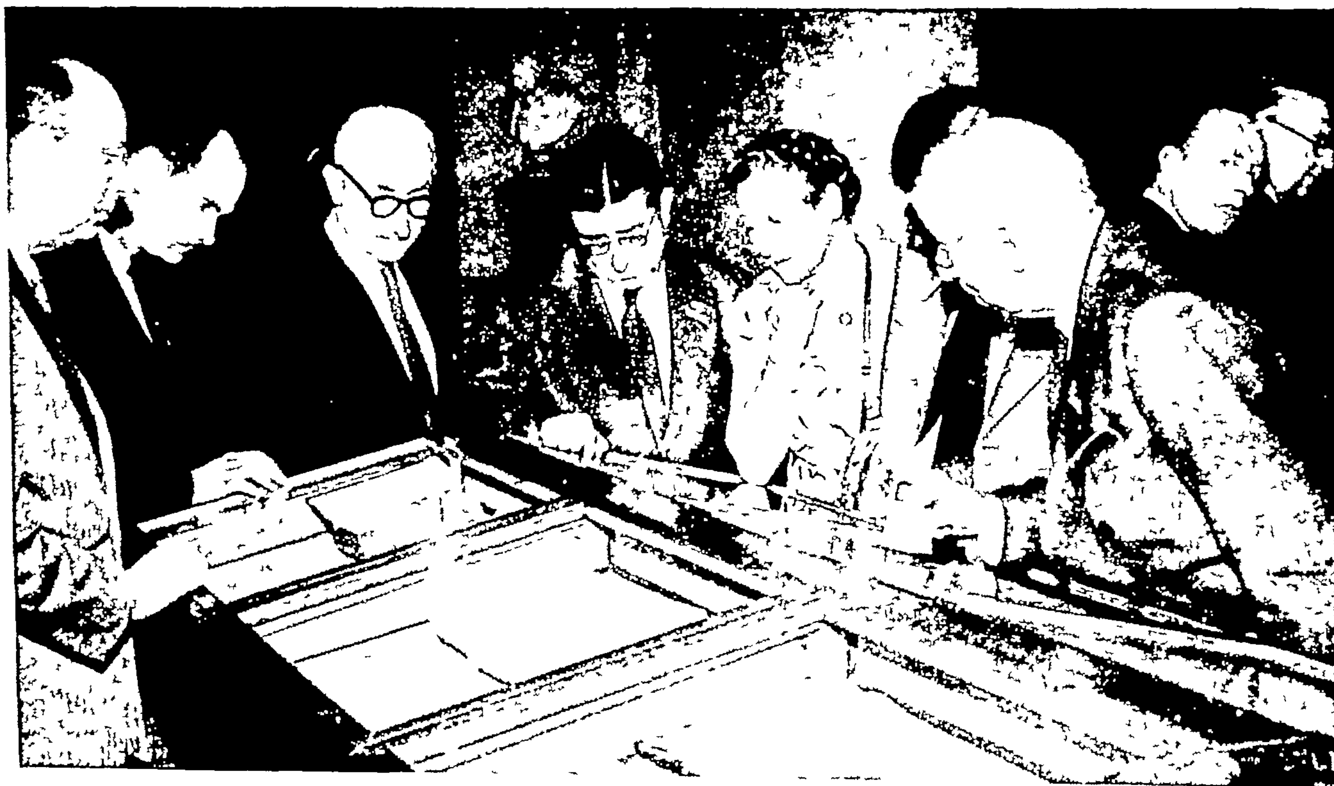
Professor N Blokhin U S S R Mr C Recamier France and Professor J Bardach Poland



Professor S M Dupertuis U S A Mrs V Blocker U S A Dr E. L. Robertson Trinidad and Dr D R Millard Jr U S A



(Left-hand picture) Dozent V Karfík, Czechoslovakia and Dr Chi-Mou Meng, China In background Dr E Hitchin, Canada (Right-hand picture) Dr J Francillon, France and Dr R Tubiana, France



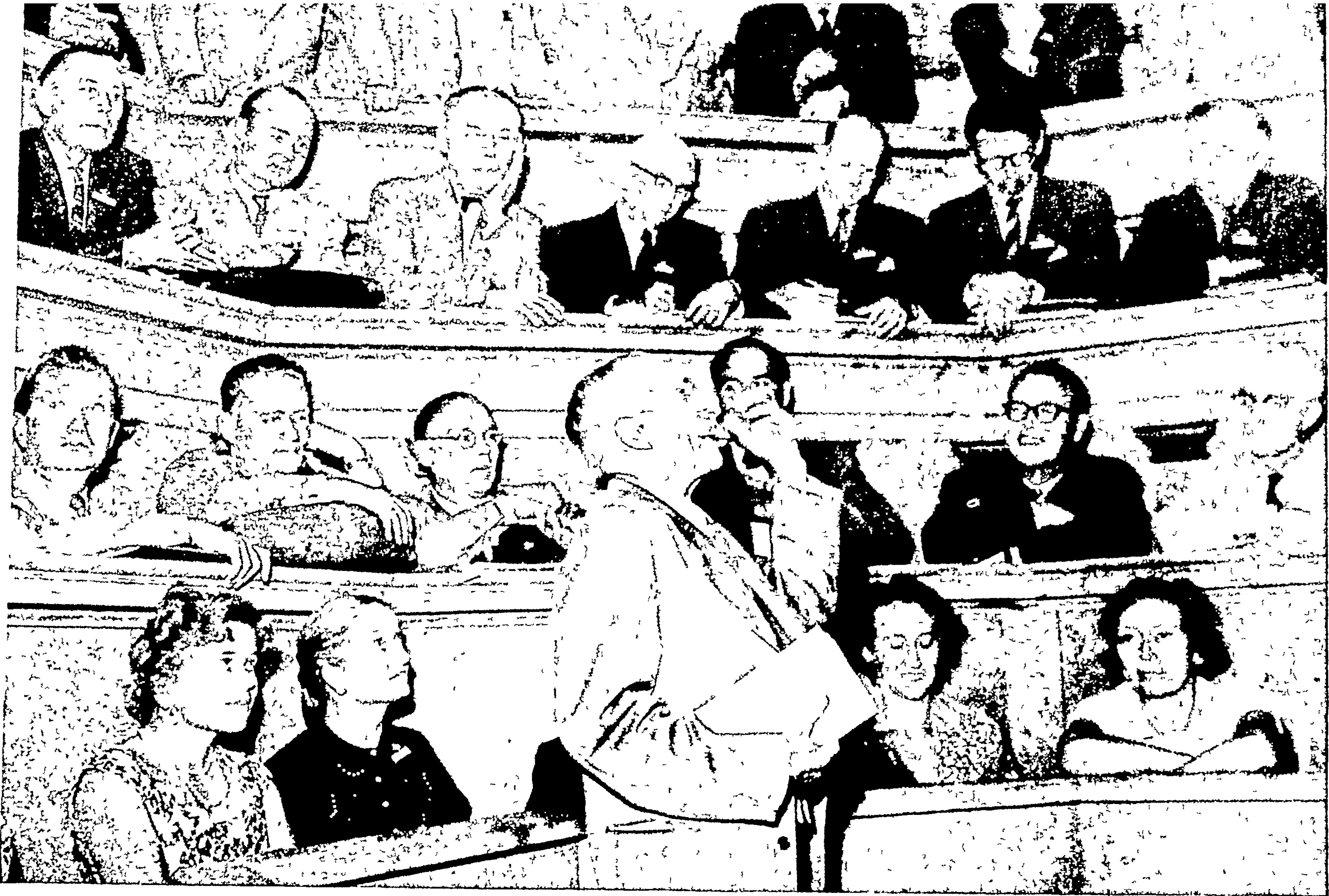
Dr G Aufricht, U S A , Dr D Lucca, Venezuela, Professor A Visjnevskij, U.S.S R , Professor H Konuralp, Turkey, Dr M Kaván, Austria and Sir Harold Gillies, England



Professor F Burian Czechoslovakia Professor T P Kilner England and Dr A. Berndorfer Hungary



Sir Archibald McIndoe England, Mrs. N Rees, U.S.A Mr G Morley England and Mrs. K. Jayes England.

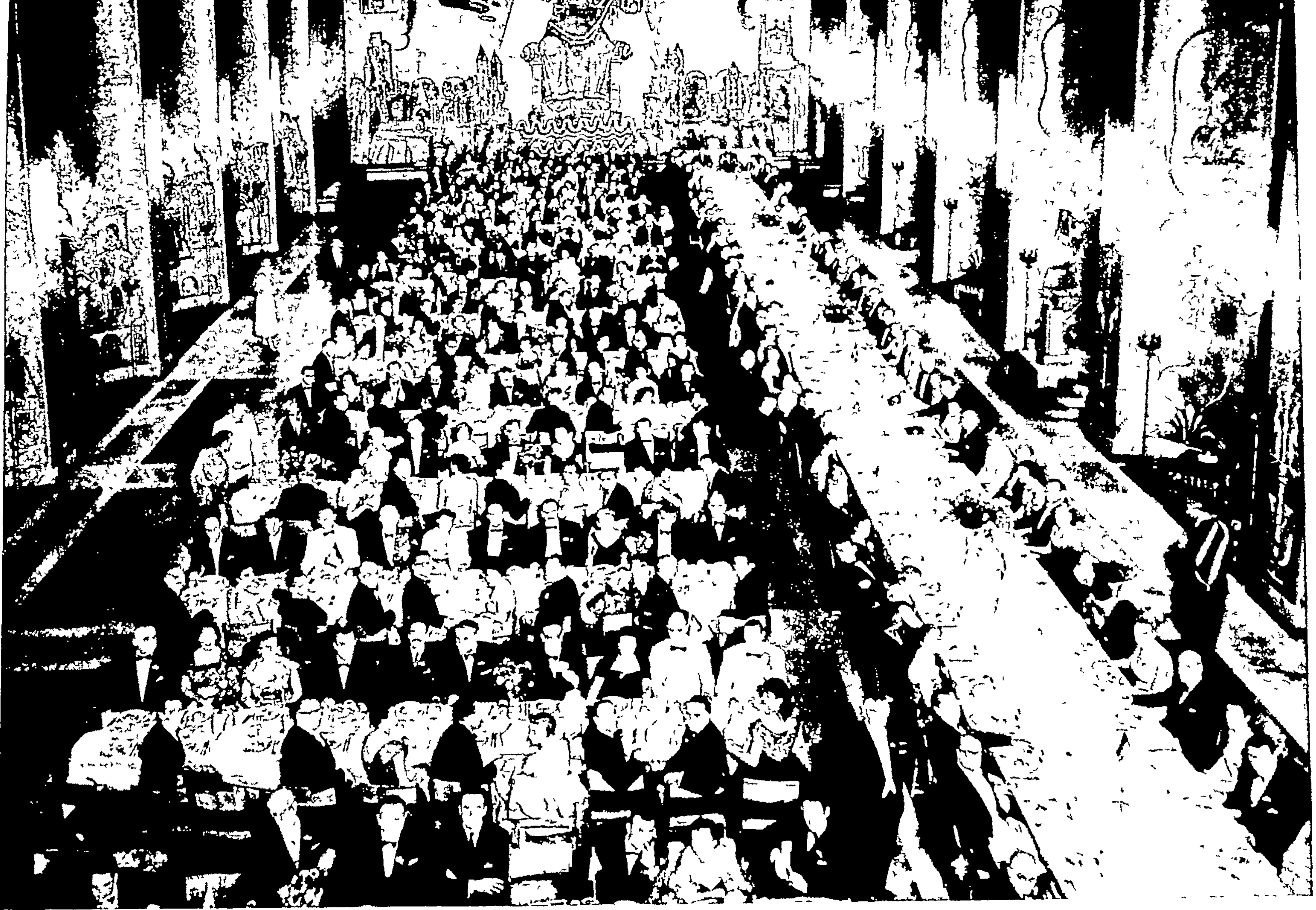


Professor emerit G Nystrom Sweden lecturing in the old anatomy theatre in Uppsala

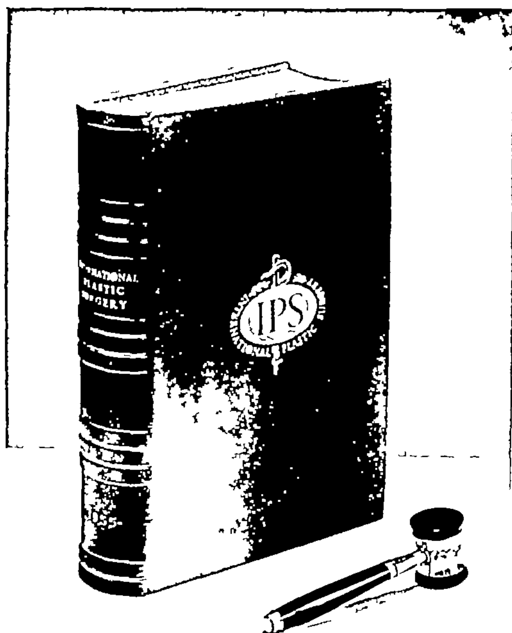
Dr R McCormack, U.S.A. Dr and Mrs A R Tilley Canada.



Mrs G Hogeman Sweden, Mrs and Dr R Dingman U.S.A and Docent K. E. Hogeman, Sweden.



The Banquet in the Gulden Hall, Stockholm



The Congress Scroll (48 x 30 x 9 cm in blue leather) and the Congress mallet.

List of Members

ADAMS, WILLIAM M, M D, 902 Madison Avenue, Memphis, Tenn, USA
ALBERCA CORDERO, FERNANDO, M D, 18, Montesa Street, Madrid, Spain
ALCOVÉR DE MOURA, PEDRO, M D, Av Presidente Wilson 159, Sao Vincente, S P, Brazil
ALVAREZ-LOVELL, LUIS, Plastic Surgeon, Pza Independencia 4, Madrid, Spain
ALVAREZ-LOVELL, CARIDAD, MRS
ALVINO, VINCENZO, M D, Piazza Ungheria 6, Roma, Italy
ALVINO, ANNA, MRS
ANDINA, FEDERICO, Chief Surgeon, Via S Francesco 9, Locarno, Switzerland
ANSPACH, KARL, DR, Meckenheimerallee 143, Bonn, Germany
APOLO, ENRIQUE, Canelones 923, Montevideo, Uruguay (not attending)
ARESPACOCHAGA, FRANCISCO, 855 Montevideo Street, Buenos Aires, Argentina
ARNERI, VINKO, Chief of Plastic Surgery, Svetozara Markovića 26, Beograd, Yugoslavia
ARTZ, CURTIS P, LT COLONEL, Director, Surgical Research Unit, BAMC, Fort Sam Houston, Texas, USA
ASCHAN, PER ERIK, DR, Westend, Helsinki, Finland
ASCHAN, EBBA, MRS
ASSMANN, ANTON HUBERT, DR, Kirchstrasse 20 Letmathe (Westf) Germany
AUFRICHT, GUSTAVE, M D, 1009 Park Avenue, New York 28, N Y, USA
AUFRICHT, MARIA, MRS
AZZOLINI, ALBERTO, DR, Via Commenda 19, Milano, Italy

BALENSWEIG, IRWIN, DR, 667 Madison Ave, New York, N Y, USA
BANFIELD, ERNEST E, M D, 1202 Ventura Drive, Tacoma 6, Washington, USA
BANFIELD, HELEN, MRS
BARDACH, JANUDZ, PROF, Lodz Klinika Chirurgii Szczekowo-Twarzowej, Kopcinskiego 22, Lodz, Poland
BARISONE, HECTOR A, M D, 495 W 187th Street, New York City, N Y, USA
BARON, HEINZ, Dozent, Gneisenaustrasse 38, Dusseldorf, Germany
BARSKY, ARTHUR J, M D, 174 East 72nd Street, New York 21, N Y, USA
BARSKY, HANNAH, MRS
BARSKY, ARTHUR J
BAUER, GERHARD, DR, Dransfeldstrasse 5, Frankfurt/M W 13 H, Germany
BAUER, THOMAS, Ass PROF, 408 Hume Mansur Building Indianapolis, Indiana, USA
BECA, JOSÉ, M D, Calle O'Donnel n 37, Madrid, Spain
BECA, PILAR, MRS
BECHER, HELMUT, DR, Bad-Homburg v d H, Germany
BECHER, MRS
BEHAIRY, GAMAL EL DIN, M D, 176, Khedive Ismail Street, Cairo, Egypt
BEHAIRY, ZINAT, MRS
BELL, ROBERT C, F R C S, 20 Linden Rd, Gosforth, Newcastle on Tyne, Great Britain
BELL, PHYLLIS, MRS
BERGONZELLI, VITTORIO, M D, via Donizetti 4, Torino, Italy
BERNDORFER, ALFRÉD, DR, VI Benczur utca 39/a, Budapest, Hungary
BERNSTEIN, DAVID, M D, 1342, 51st St, B'klyn 19, N Y, USA
BERNSTEIN, DOROTHY, MRS
BERSON, MORTON I, 133 East 58th Street, New York 22, N Y, USA
BIRKE, GUNNAR, Ass PROF, Karolinska sjukhuset, Stockholm 60, Sweden
BISHOP, BERNARD W F, F R C S, c/o Nuffield Dept of Plastic Surgery, Churchill Hospital, Oxford, Great Britain
BISHOP, HELEN, MRS
BLOCKER, JR, TRUMAN G, PROF, University of Texas Medical Branch, Galveston, Texas, USA
BLOCKER, VIRGINIA, DR, MRS
BLOCKER, ANNE, MISS

BLOKHIN NICOLAI N PROF., M.D Academy of Medical Science USSR Solinka 14 Moscow USSR

BLOMQUIST KJELL V., Avd tandlakare, Ribevägen 11 b Malmö Sweden

BORGGREN M B Dentist Lasarettet Boden, Sweden

BROWNE, DENIS F R C S., 46 Harley Street London W.1., Great Britain

BROWNE, MOIRA MRS

BUFF HANS-ULRICH M.D., Solothurn Switzerland

BUFF H U MRS

BURIAN FRANCIS PROF M D Skrétova 8 Prague XII Czechoslovakia

BUSSE, FROHWALT M D Haslach im Kinzigtal bad. Scharzwald Germany

BUSSE KATHE, M D., MRS

BACKDAHL, MAGNUS DR., St Görans Sjukhus Stockholm, Sweden

BÄCKDAHL, BRITA MRS

BÖWERING FERDINAND Chefarzt Wittenerstr 62, Castrop-Rauxel Switzerland

BÖWERING GERTRUD MRS

BÖWERING SIGRID MISS

BÖWERING ELLEN MISS

BÖWERING ANNETTE, MISS

CALABRO NATALE, DR., S Vitale 59 Bologna Italy

CALANDRI FERNANDO M.D., Via Carlo Alberto 43 Roma, Italy

CALATRAVA LUIS M D Calle de Ibiza 22 Madrid Spain

CAÑIZARES RAUL M D., I 502 Dept. 26 Vodado, Havana Cuba

CAÑIZARES ANDREU CONCEPCION MRS

CARSTAM NILS G M.D Assoc Prof Kronborgsvägen 3 a Malmo Sweden

CARSTAM SIGRID MRS

CERNEA PIERRE PROF., 74 Avenue Marceau, Paris France

CERNEA, SUZANNE, MRS

CHAMPION RANDELL, F R C S 24 a St John Street Manchester Great Britain

CHRISTENSEN EUGENE L. M D 920 Roosevelt Bldg 727 West Seventh St Los Angeles 17 Calif., USA

CIOCCA CARLO M D., Vicolo Pattari 3 Milano Italy

CLARKSON PATRIK W., F.R.C.S 107 Harley Street, London W 1., Great Britain

CLEGG REID SMOOT DR., South Lake City East South Temple USA

CLERICI BAGOZZI INNOCENZO M.D., Corso Buenos Aires 17 Milano Italy

CLERY ANTHONY B M.D., 59 Fitzwilliam Square Dublin Ireland

CLERY GABRIELLE, MRS

COELST, M., DR., 58 Avenue Emile Duray Bruxelles Belgium

COLSON PIERRE M J M.D 34 Place Bellecour Lyon France

COLSON JOSETTE, MRS

CONSIGLIO VITTORIO M.D Clinica S Giovanni Via d Azeglio 16 Bari Italy

CONVERSE, JOHN M., M D 722 Park Avenue New York N Y., USA

CONVERSE, SHEILA MRS

CONWAY HERBERT M.D., The New York Hospital 525 East 68th Street New York 21 N Y., USA

CORDON C., Paseo Pintor Rosales 16 Madrid, Spain

CRONIN THOMAS D., M D., 6615 Travis St. University Professional Bldgs., Houston 25 Texas USA

CRONIN ANNE MRS

CRONIN THOMAS JR.

CRONIN ROBERT

CRONIN ANNE FRANCES MISS

CUBERO-OTOTA GONZALO M.D., Hohenzollernstrasse 55 Bad Godesberg Germany

CUBERO-OTOTA MRS

CUPAR, IVO M D PROF Amruseva 10 Zagreb Yugoslavia

CUZIN LOUIS DR 5 Villa Chaptal Levallois Perret Seine France

CUZIN MRS

D ALESSIO, ELIO M.D Via Medina 63 Napoli, Italy

DAMIAO PIRES ELIAS M.D Av Defensores de Chaves 58 I D Lisboa Portugal

DAMIAO PIRES IRENE, MRS

DAMIAO PIRES ISABEL, MISS

DE CHOLNOKY TIBOR, M.D 10 East 80 New York City N Y USA

DE CONINCK ALBERT M D 55 R Baron de Castro Bruxelles, Belgium

DE CONINCK CHRISTIANE, MRS

DE LARA, MARIA JULIA DR. Calzada No 710 Vedado Habana (not attending) Cuba

DENECKE, H., PROF, Kepersv 55, Heidelberg, Germany
DE NEGRI, ALDO, M D, Via Sidoli 1, Milano, Italy
DE NEGRI, CLARA, MRS
DE STEFANO, CARLO, M D, Via Caracciolo 14, Napoli, Italy
DE TOMASI, LUIGI, M D, Foro Bonaparte 51, Milano, Italy
DECK, KARL O, M D, Sendlingerstr 57/II, Munchen, Germany
DECK, ELISABETH, MRS
DEMJÉN, STEFAN, Docent, klinika plastickej chirurgie UK, Partizánska I, Bratislava, Czechoslovakia
DERGANC, KAZIMIR, Plastic Surgeon, Surgical Clinic of the Medical Faculty, Ljubljana, Yugoslavia
DI FRANCESCO, ANTONIO, DR, c/o Haggstrom, Nybergsgatan 4, Stockholm, Sweden
DINGMAN, REED, M D, 1407 Lincoln, Ann Arbor, Michigan, USA
DINGMAN, THELMA, MRS
DIÑO, BENVENUTO R, LT COL, V Luna General Hospital, A F P Quezon City, Phillippines
DIÑO, PERFECTA L, M D
DOGO, GIOVANNI, M D, Via XX Settembre 29, Padova, Italy
DOMMERSNES, IVAR, DR, Rikshospitalet, Oslo, Norway
DUFOURMENTEL, CLAUDE, Chirurgien, 19 Avenue Charles Floquet, Paris VII, France
DUFOURMENTEL, MARIANNE, MRS
DUNCAN, WALLACE H, M D, 1411 Beaumont, McAllen, Texas, USA
DUPERTUIS, S MILTON, ASS PROF, 3600 Forbes Street, Pittsburgh 13, Penna, USA
DUPERTUIS, JOAN, MRS

ECKHOFF, NILS L, F R C S, Keats' House Guy's Hospital, London S E 1, Great Britain
ECKHOFF, AUDREY, MRS
EHRENBERG, GOSTA, DR, Aug Wahlst vag 27, Danderyd, Sweden
ELLER, JOSEPH J, M D, 745 Fifth Avenue, New York City, N Y, USA
ELLER, ADRIANA, MISS
ENGDAHL, INGER, M D, Smakkegaardsvej 129, Gentofte, Denmark
ENGLUND, GUNNAR, DR, Hornsgatan 51, Stockholm, Sweden
ENGSTROM A UNO, DR, Jakobsdalsg 21, Goteborg, Sweden
ENGSTROM, KARIN, MRS
ENTIN, MARTIN, M D, Royal Victoria Hospital, Montreal, Canada
EPTING, MONROE J, 722 Drayton St, Savanna, Georgia, USA
ERB, KARL, DR, Elchenkirchen, Germany
ERDÉLYI, ROBERT, M D, Zimná 16 Košice, Czechoslovakia
ERNST, JØRGEN, M D, Ejgaardsvej 30, Charlottenlund, Denmark
ERNST, KAREN, MRS
ÉRSZY, MIKLÓS, DR, XIII Szent István krt 4, Budapest, Hungary
ESCOBAR, JULIAN, M D, Cali, Columbia
ESCOFFIER, JEAN-BERNARD, M D, 8, rue Murillo, Paris VIII, France

FAIRMAN, JAMES, M D, Larrea 1429 3-A, Buenos Aires, Argentina
FAIRMAN, DE LYDIA, MRS
FARDEAU, ANDRÉ, M D, 130 Av Fr Roosevelt, Bruxelles, Belgium
FARDEAU, JACQUELINE, MRS
FERNANDEZ RIESGO, MANUEL, M D, Paseo Pintor Rosales 16, Madrid, Spain
FIGI, FREDERICK A, PROF, Mayo Clinic, Rochester, Minnesota, USA
FIGI, BERTHA, MRS
FILIPPI, BRUNO, M D, Guettacielo Leon Pancalolo, Savona, Italy
FIRINU, FRANCESCO, M D, Viale Trieste 2, Cagliari, Italy
FOGH-ANDERSEN, POUL, M D, Moltkesvej 71, Copenhagen F, Denmark
FOGH-ANDERSEN, BIRGIT, MRS
FOURRIER, PAUL, DR, 28 rue Bonnabaud, Clermont-Ferrand, France
FOURRIER, ANDRÉE, MRS
FRACKELTON, WILLIAM H, M D, 2403 E Newberry Blvd, Milwaukee 11, Wisconsin, USA
FRACKELTON, JANE, MRS
FRACKELTON, JR WILLIAM H, MASTER
FRACKELTON, SUSAN L, MISS
FRANCILLON, JACQUES, DR, 8 rue de la Martinière, Lyon 1, France
FRANCILLON, CLAUDE, MRS

BLOKHIN, NICOLAI N., PROF., M D., Academy of Medical Science USSR Solinka 14 Moscow USSR

BLOMQUIST KJELL V Avd tandlakare Ribevägen 11 b Malmo Sweden

BOROGREN M B Dentist Lasarettet Boden Sweden

BROWNE DENIS F.R.C.S 40 Harley Street London W 1 Great Britain

BROWNE MOYRA MRS

BUFF HANS-ULRICH M D., Solothurn Switzerland

BUFF H U., MRS

BURIAN FRANCIS PROF M D., Skrétova 8 Prague XII Czechoslovakia

BUSSE FROHWALT M D Haslach im Kinzigtal bad Scharzwald Germany

BUSSE KATHE, M D., MRS

BACKDAHL, MAGNUS DR., St Görans Sjukhus Stockholm Sweden

BACKDAHL, BRITA MRS

BÖWERING FERDINAND Chefarzt Wittenerstr 62 Castrop-Rauxel Switzerland

BOWERING GERTRUD MRS

BÖWERING SIGRID MISS

BÖWERING ELLEN MISS

BÖWERING ANNETTE, MISS

CALABRO NATALE DR., S Vitalo 50 Bologna, Italy

CALANDRI FERNANDO M D Via Carlo Alberto 43 Roma Italy

CALATRAVA LUIS M D Calle de Ibiza 22, Madrid, Spain

CAÑIZARES RAUL M.D I 502 Dept 26 Vedado, Havana Cuba

CAÑIZARES ANDREU CONCEPCION MRS

CARSTAM *NILS G M D Assoc Prof.*, Kronborgsvägen 3 a Malmö Sweden

CARSTAM SIGRID MRS

CERNEA, *PIERRE* PROF., 74 Avenue Marceau Paris France

CERNEA SUZANNE, MRS

CHAMPION RANDELL F R C.S 24 a St John Street Manchester Great Britain

CHRISTENSEN EUGENE L. M D 929 Roosevelt Bldg., 727 West Seventh St., Los Angeles 17 Calif., USA

CIOCCA CARLO M.D Vicolo Pattari 3 Milano Italy

CLARKSON PATRIK W F R C.S 107 Harley Street, London W 1 Great Britain

CLEGG REED SMOOT DR., South Lake City East South Temple USA

CLERICI BAGOZZI INNOCENZO M D., Corso Buenos Aires 17 Milano Italy

CLERY, ANTHONY B., M.D., 50 Fitzwilliam Square Dublin Ireland

CLERY GABRIELLE, MISS

COELST M., DR., 58 Avenue Emile Duray Bruxelles Belgium

COLSON, PIERRE M J M D., 34 Place Bellecour Lyon France

COLSON JOSETTE, MRS

CONSIGLIO VITTORIO M D Clinica S Giovanni Via d Azeglio 10 Bari Italy

CONVERSE, JOHN M., M D., 722 Park Avenue New York, N Y., USA

CONVERSE, SHEILA MRS

CONWAY HERBERT M.D., The New York Hospital 525 East 68th Street New York 21 N Y., USA

CORDON C., Paseo Pintor Rosales 16 Madrid Spain

CRONIN THOMAS D M D., 6615 Travis St. University Professional Bldg., Houston 25 Texas USA

CRONIN ANNE, MRS.

CRONIN THOMAS JR

CRONIN ROBERT

CRONIN ANNE FRANCES MISS

CUBERO-OTOYA GONZALO M.D., Hohenzollernstrasse 55 Bad Godesberg Germany

CUBERO-OTOYA, MRS

CUPAR IVO M.D., PROF Amruseva 10 Zagreb Yugoslavia

CUZIN LOUIS DR., 5 Villa Chaptal Levallois Perret Seine France

CUZIN MRS

D ALESSIO ELIO M.D., Via Medina 63 Napoli, Italy

DAMIAO PIRES ELIAS M.D Av Defensores de Chaves 58, I D Lisboa Portugal

DAMIÃO PIRES IRENE, MRS

DAMIAO PIRES ISABEL MISS

DE CHOLNOKY TIBOR, M.D 10 East 80 New York City N Y USA

DE CONINCK ALBERT M.D 55 R Baron de Castro Bruxelles, Belgium

DE CONINCK, CHRISTIANE MRS

DE LARA MARIA JULIA DR., Calzada No 710 Vedado Habana (not attending) Cuba

HIGAZI, HUSSNI EL SAYED, DR, 2 Sherif Pascha El Kebir St, Cairo, Egypt
HILLERSTROM, KURT E M, ASS PROF, Tandlakarhogskolan, Stockholm 3, Sweden
HILLERSTROM, MARGARETA, MRS
HINRICSSON, HARRY, COLONEL, Grongatan 25, Östersund, Sweden
HINRICSSON, LOUISE, MRS
HIRST, OTTO C, M D, Duval and Greene Sts, Philadelphia, Penna, USA
HIRST, MRS
HITCHIN, EDWARD, M D, 421 Tegler Building, Edmonton, Alberta, Canada
HOFFMAN, KLAUS, M D, Luneberger Str 30''', Hamburg-Harburg, Germany
HOFFMAN, INGEBURG, MRS
HOGEMAN, KARL-ERIK, M D ASSOC PROF, Allmanna sjukhuset, Malmo, Sweden
HOGEMAN, GERTRUD, MRS
HOLMSTRAND, KAJ, DR, Varvsgatan 2, Stockholm, Sweden
HOLMSTRAND, MIMA, MRS
HONIG, CORNELIS A, DR, 8 Willemsplantsoen, Utrecht, Netherlands
HONIG-REITSMA, ELISABETH, MRS
HOOVER, JOHN, DR, 211 Andrews St Rossville, Ga, USA
HORISBERGER, DR, Kanton Spital, St Gallen, Switzerland
HSU, TIEN-I, PLASTIC SURGEON, Peking, China

ISAKSSON, IVAR, DR, Kir klin I, Sahlgrenska Sjukhuset, Goteborg, Sweden
IVY, ROBERT H, PROF EM, 1930 Chestnut Street, Philadelphia, USA (not attending)

JACKSON, DOUGLAS M, F R C S, Birmingham Accident Hospital, Birmingham, Great Britain
JACKSON, PAULINE, MRS
JACKSON, CHRISTOPHER, MASTER
JACKSON, ANDREW, MASTER
JAYES, PERCY H, F R C S, 149 Harley Street, London W 1, Great Britain
JAYES, KATHLEEN, MRS
JAYES, BRIAN H, MASTER
JUST, ANNELIESE, DR, Porchestrasse 78, Wolfsburg, Germany
JOHANSON, BENGT C A, M D, ASSOC PROF, Wittstocksgatan 21, Stockholm, Sweden
JOHNSON, HARRY A, M D, 4382 Browndale Avenue, Minneapolis, Minnesota, USA
JOHNSON, ESTHER, MRS

KARFIK, VÁCLAV, Docent, Berkova 36 Královo Pole, Brno, Czechoslovakia
KARLEEN, CONRAD I, M D, 402 Medical Arts Building, Minneapolis, Minnesota, USA
KARLEEN, RUTH, MRS
KAZANJIAN, VARAZTAD H, PROF M D, 475 Commonwealth Avenue, Boston, Mass, USA
KAZANJIAN, MARION, MRS
KAVÁN, MARGUERITE, DR, Dominikaner Bastel 4, Vienna, Austria
KEHLET HANSEN, SIGURD, DR, Copenhagen p t Kommunale Sygehus, Åbenrå, Denmark
KEHLET HANSEN, IBEN, DR, MRS
KESSLER, HENRY H, M D, 53 Lincoln Park, Newark 2, New Jersey, USA
KESSLER, JESSIE, MRS
KIEHN, CLIFFORD L, M D, 10605 Chester Avenue, Cleveland 6, Ohio, USA
KIEHN, MARGARET, MRS
KILNER, POMFRET T, PROF, Nuffield Dept of Plastic Surgery, The Churchill Hospital, Oxford, Great Britain
KILNER, FLORENCE MARY, MRS
KIRNER, JOSEF, DR, Waldshut, Baden, Germany
KIRSCHBAUM, SIMON, M D, Cordoba 850, Buenos Aires, Argentina
KJELLGREN, K ARNE, DR, Lasarettet, Skellefteå, Sweden
KJELLGREN, BIRGER, Övertandlakare, Eastmaninstitutet, Stockholm, Sweden
KJELLGREN, KERSTIN, MRS, Eastmaninstitutet, Stockholm, Sweden
KLINGBEIL, JEROME R, M D, 815 Professional Building, Long Beach 13, Calif, USA
KOCH, CAREL F, M D, Hacquartstraat 15, Amsterdam, Netherlands
KOCH, C, MRS
KOECHLIN, HENRI, PRIV DOZ, 59, rue du Rhône, Geneva, Switzerland
KONURALP, HALIT ZIYA, PROF, Elhamra Apt 1, Beyoglu, Istanbul, Turkey
KOSTEK, TADEUSZ, DOC M D, ul Wiejska 15 m 11, Warszawa, Poland
KURKIALA, R, DR, Lonnrotsg 22 A, Helsingfors, Finland

FREDRICKS SIMON DR. 1644 Walton Ave New York 52, N Y USA

FREIDEL DR. Rue de la République, Lyon France

FRITZ KARL, DR. Mariannengasse 10 Vienna IX Austria

GABARRÓ PERE M D Diagonal 598 Barcelona Spain

GABARRÓ JOSEFINA MRS

GABKA JOACHIM M.D Romerweg 81 Berlin Karlshorst Germany

GALINDO JOSÉ SÁNCHEZ DR. O'Donnell 37 Madrid Spain

GALLASSI AUGUSTO PROF M.D Via XXI Aprile 1945 N 15 Bologna Italy

GELB JEROME M.D., 31 Lincoln Park Newark 2 New Jersey USA

GELB NINA MRS

GELBKE, HEINZ W F Priv Dozent Chirurgische Universitatsklinik Göttingen Germany

GELBKE, GERTRAUD M.D., MRS

GIBSON THOMAS, M.D Eastbrae 20 Potterhill Avenue Paisley Scotland

GILLIES HAROLD SIR, 149 Harley Street London W 1 Great Britain

GILLIES KATHLEEN LADY

GLITSCH FLORENCE MISS 59 rue du Rhône Geneva, Switzerland

GONZALEZ ULLOA MARIO M D., Tuxpan 23 Zona 7 México D.F México

GOTTLIEB OTTO Reservlaege Kr Zahrtmanns Pl 80 Copenhagen F Denmark

GOTTLIEB INGEBORG TANDLAEGE, MRS

VON GRALATH R DONATI Dott., Via Bertoloni 12 Rome Italy

GRAS-ARTERO MIGUEL, M.D Lauria 86-88 Barcelona Spain

GRAS-ARTERO ANGELES, MRS

GREELEY PAUL W PROF M D 224 South Michigan Avenue Chicago 4 Ill USA

GREELEY EUNICE, MRS

GRELLET MAURICE, M D 170 bis Bd Haussmann Paris France

GRELLET DENISE MRS

GRENABO KARL-JOHAN DR. overläkare Torstenssonsgatan 12 Stockholm Ö Sweden

GRENABO MAJ MRS

GRIGNON JEAN L., M.D 17 Avenue Montaigne Paris VIII France

GRIGNON SUZANNE, MRS

GROTTE P GUNNAR DR., Fysiologiska Inst., Uppsala Sweden

GROTTING JOHN K M.D., 948 Medical Arts Building Minneapolis Minnesota USA

GROTTING SHIRLEY MRS

GRUNDT BJARNE, DR. Drammensvejen 23 Oslo Norway

GRUNDT INGRID MRS

GURDIN MICHAEL, M D., 410 N Bedford Drive Beverly Hills Calif., USA

GURDIN MISS

GURNEY CHARLES E. M D., 401 Medical Arts Bldg Portland 5 Oregon USA

GURNEY CH., MRS

GUSTAFSSON KARL GUSTAF Tandläkare Kvarnbergsvägen 1 II Falun Sweden

GUSTAFSSON ELSA MRS

GÜRSCHING JOHANNES DR., Schweizerstrasse 23 Frankfurt a.M Germany

GYLLING UNO SAKARI Brändovägen 45 Helsingfors Finland

GYLLING HJÖRDIS MRS

HAGE, JACOBUS M.D., Oisterwijkselaan 188 Tilburg Netherlands

HAGE GEORGETTE MRS

HALLGRIMSSON SNORRI M.D PROF., Asvallagata 26 Reykjavik, Iceland

HARRIS HAROLD I ASS PROF., 625 S Bonnie Brae Los Angeles 57 Calif., USA

HARRIS DOROTHY MRS

HARRIS MALCOLM MR.

HAUG PROF Bürgerhospital Stuttgart Germany

HEAD MURDOCK DR., 5009 Osceola Rd Washington D C USA

HEINKE, ROLF M D., Krankenhaus Leninstrasse Karl Marx-Stadt, Germany

HEINZE MRS Zeisigwaldstrasse 101 Karl Marx-Stadt Germany

HEMMERICH KURT M.D., Maximilian Str 43 München 22, Germany

HEMMERICH HILDEGARD DR., MRS

HERBST MARTIN M.D., Chirurgische Universitätsklinik, Liebigstr 20 Leipzig C-1 Germany

HERBST M MRS

HERLYN KARL EWALD PROFESSOR Hanssenstr 17 Göttingen Germany

HERTZ JOHN M.D PROF Tandläkarhögskolan Holländaregatan 17 Stockholm C Sweden

MALINIAC, JACQUES W, M D, 30 Central Park South, New York, 19, N Y, USA
MANNERFELT, LENNART, DR, Kirurgiska avd, Lanslasarettet, Fagersta, Sweden
MANNERFELT, HELENA, MRS
MANSFIELD, OLIVER T, F R C S, 55 Somerset Road, Edgbaston, Birmingham 15, Great Britain
MARCKS, KERWIN M, M D, 941 Hamilton Street, Allentown, Penna, USA
MARCKS, MONA, MRS
MARINO, HÉCTOR, M D, Arenales 883, Buenos Aires, Argentina
MARINO, SUSANA, MRS
MATHESON, WILLIAM S, F R C S, General Hospital, Northampton, Great Britain
MATZEN, PETER FRIEDRICH, PROF D.M, August-Bebel-Str 13 a, Halle/S, Germany
MAY, HANS, M D, ASS PROF, 255 S 17th Street, Philadelphia 3, Penna, USA
MEIER, LUDWIG, Prakt Arzt, Bahnhofstrasse 18, Oldenburg, Germany
MELA, VITTORIO, PROF, Via Roma 11, Genova, Italy
MELA, MRS
MELILLO, PIETRO, M D, 88 Abruzzi, Milano, Italy
MENG, CHI-MOU, Plastic Surgeon, Central People's Hospital, Peking, China
MENNIG, HARRY, Dozent, Univ -Ohrenklinik, Jena/Thuringen, Germany
MENSHER, IRA W, M D, 50 Plaza Street, Brooklyn 38, N Y, USA
MENSHER, VERA, MRS
MEYER, RUDOLF, M D, Bahnhofstr 7, St, Gallen, Switzerland
MIKI, ISAHARU, PROF, Medical Dpt, University of Tokyo 1 Motofuji-cho, Bunkyo-ku, Tokyo, Japan (not attending)
MILLARD, JR, D RALPH, M D, 1 Sunset Trial, Asheville, North Carolina, USA
MIRABET IPPOLITO, VICENTE J, M D, Avda Baron de Carcer 23, Valencia, Spain
MIR Y MIR, LORENZO, M D, Diagonal 331, Barcelona, Spain
MIR Y MIR, MARY, MRS
MOBERG, ERIK, M D, ASSOC PROF, Sahlgrenska sjukhuset, Goteborg, Sweden
MOREL-FATIO, DANIEL, M D, 4 Rond-Point de Longchamp, Paris 16e, France
MOREL-FATIO, JEANNINE, MRS
MORLEY, GEORGE H, Group Captain, South Coombe, Wendover, Bucks, Great Britain
MORLEY, KATHLEEN, MRS
MOWLEM, RAINSFORD, F R C S, 149, Harley Street, London, W 1, Great Britain
MUIR, IAN F K, F.R C S, Mount Vernon Centre for Plastic Surgery, Mount Vernon Hospital, Northwood, Middlesex, Great Britain
MUÑIZ, MANUEL A., Odontologist, José E Uriburu 1053, Buenos Aires, Argentina

NEUMAN, ZVI, M D, Hadassah University Hospital, Jerusalem, Israel
NEUMAN, LEVANONAH, MRS
NICOLAUS, HERMANN, M D, Rathenauplatz 13/14, Hannover, Germany
NICOLAUS, ERICA, MRS
NORDIN, KARL-ERIK, DR, Linnégatan 17, Stockholm, Sweden
NOSENZO, MARIO, Capt Air Force, Hipólito Irigoyen 1284, 5 piso Buenos Aires, Argentina
NYLÉN, BENGT, DR, Akademiska sjukhuset, Uppsala, Sweden
NYQUIST, GOTE V O, PROF, Tandlakarhogskolan, Malmo 7, Sweden

OAKEY, RICHARD S, JR, M D, 255 S 17th Street, Philadelphia 3, Penna, USA
OBWEGESER, HUGO L, M D, Oberarzt, Zahnarztliches Institut der Universitat Zurich, Zurichbergstr 8, Zurich, Switzerland
OBWEGESER, L, MRS
OCHANDIANO, DR, Hermanos Miralles 95, Madrid, Spain
OLAISON, FRIDOLF, Las lak, Falun, Sweden
OLAISON, MAUD, MRS
OLSEN, GRETE, Plastikkirurg, Skodsborgvej 144, Holte, Denmark
SØEGAARD, INGA, MRS
OMBRÉDANNE, MARCEL, Laryngologist, 4 rue de Logelbach, Paris, France
OMBRÉDANNE, GEORGETTE, MRS
OMBRÉDANNE, DANIEL, MR
OMBRÉDANNE, PIERRE, MR
VON ONDARZA, RAMON, Dozent, Bad Oldesloe bei Hamburg, Germany
OTERMIN-AGUIRRE, JULIO, Plastic Surgeon, Castelli 195, Buenos Aires, Argentina

PALACIO POSSE, RAMON LAS HERAS 2321, Buenos Aires, Argentina

KWEDER DAVID J DR. 1432 N Sheridan Rd., Waukegan Ill USA
KÖLE, HEINRICH DR., Universitats-Zahnklinik Auenbruggerplatz 12 Graz Austria
KÖRBER, RUDOLF G H M.D., Waldhausen strasse 35 Hannover Waldhausen Germany
KÖRBER HANNA MRS
KÖRLOF BENGT DR., Brantingstorget 20 Uppsala Sweden
KÖRLOF ULLA MRS

LABORDE, CÉSAR, M D., Cuernavaca 155 México 11 D.F., México
LADEWIG WALTER Spezialist, Manteuffelstr 1 Minden/i W., Germany
LANDESBERG JACQUES M.D., 0-5 Ocean Ave., Brooklyn 26 N Y USA
LANGSTON ROBERT G., M.D 925 West Georgia Street Vancouver British Columbia Canada
LANGSTON KATHLEEN DR., MRS
LAYTON WILLIAM C M.D., 23 Baldwin Ave., San Mateo Calif., USA
LAYTON EDNA MRS
LAYTON JR. WILLIAM C MR.
LAYTON GEORGE F., MR.
LEBLOND HAROLD D., M.D., 026 E. San Antonio Drive Long Beach Calif USA
LENZ LUDWIG M.D 21 Sh Antikhana Cairo Egypt
LETTERMAN GORDON DR., 2700 Que St., N W Washington 16 D C., USA
LEVIGNAC JACQUES M.D., 21 Avenue Mac Mahon Paris France
LEVY ANNA L., 32 S Munn Ave. East Orange N J USA
LEWIN MICHAEL L. M.D 07 E 78th Street New York City N Y., USA
LEWIN M MRS
LEWIS EMLYN M.D St Lawrence Hospital, Chepstow Monmouthshire Great Britain
LEYON BENGT DR., Engelbrektsgatan 23 Stockholm Ö Sweden
LEYON INGEBJÖRG MRS
LIEDBERG CARL-FREDRIK, DR. Ryttmastaregatan 16 a, Malmö Sweden
LIEDBERG SIV MRS
LINDÉN KARL, Överläkare, Garnisonssjukhuset Boden 19 Sweden
LINDSAY R. N WM Toronto Canada
LINDSAY MRS.
LIPSET, MERRILL, M.D 1040 Park Ave., New York City USA
LITTLER, J WILLIAM M.D., 16 East Ninetieth Street New York 28 N Y USA
LITTLER, W., MRS
LOEB RAUL, DR. Rua Xavier de Toledo 316-11 -S/1110, Sao Paulo Brazil
LOENNECKEN WILHELM, Overlege Rikshospitalet Avd. Plast Kirurgi, Oslo Norway
LOENNECKEN GINA MRS
LONGACRE, JACOB J., M.D., 1503 Carew Tower Cincinnati 2 Ohio USA
LONGACRE J., MRS
LUCCA DOMINGO M.D., Edificio Caura Apt N 1 Avenida Eraso San Bernardino, Caracas, Venezuela
LUNOWITZ HORST DR., Mühlenkamp 39 Hamburg 39 Germany
LUNOWITZ MRS

MARTIN-SANCHEZ VICENTE, M.D., Pza Independencia 4 Madrid Spain
MARTIN-SANCHEZ ADELA MRS
McCORMACK ROBERT M., Assoc Prof., 260 Crittenden Blvd. Rochester 20 N Y USA
MAC DONALD PHILIP G., DR., 115 East 61 Street New York 21 N Y., USA
McDOWALL, ANDREW F.R C.S., Atholdene, Harrop Road, Hale Cheshire Great Britain
McDOWALL, DOROTHY A., MRS
McDOWALL, ROBERT A W., MASTER
McGOWAN JAMES C. J., F R.C.S "Breckland" Brundall Norwich, Great Britain
McGOWAN ELSPETH MRS
MAC GUIRE, HUGH M.D., 1216 Magnolia Curve, Montgomery Alabama USA
MAC GUIRE, MRS
McINDOE, ARCHIBALD H SIR, 149 Harley Street London W 1., Great Britain
McINDOE, CONSTANCE, LADY
MACKENZIE, DAVID L., F R C.S., Royal Berkshire Hospital Reading Berkshire Great Britain
McNICHOL JOHN W., M D 413 Medical Arts Building, 1 Young St. Hamilton Ontario Canada
MAHLER, LOTTE Dozent Nibelungenallee 37–41 Bürgerhospital Frankfurt/Main Germany
MALBEC ERNESTO F M.D Callao 868 3 B Buenos Aires, Argentina

ROSA, TOMMASO, M D, Via della Giuliana 26, Roma, Italy
ROSENTHAL, WOLFGANG, M D, PROF, Robert-Kochplatz 9, I, Berlin NW 7, Germany
ROSENTHAL, MARTHA, MRS
ROUILLARD, LOUIS M, F R C S, 79, Newmarket Road, Norwich, Norfolk, Great Britain
ROWLAND, WILLARD D, M D, 1739 S W Prospect Drive, Portland, Oregon, USA
ROWLAND, MARY P, MRS
ROY, LESLIE J, F R C S, 85 Kahu Road, Christchurch, New Zealand
ROY, JOCELYN, MRS
RUDNER, HENRY G, SR, M D, Rudner Clinic, 1108 Madison Avenue, Memphis 3, Tennessee, USA

SANCHEZ-GALINDO, JOSÉ, Plastic Surgeon, Calle O'Donnell n 37, Madrid, Spain
SANCHEZ-GALINDO, DE MARIA-IZNACIA, MRS
SANVENERO-ROSSELLI, GUSTAVO, PROF, Via Marchiondi 5, Milan, Italy
SARGEANT, DONALD, M D, Akademiska Sjukhuset, Uppsala, Sweden USA
SARGEANT, VERDA, MRS
SCATAFASSI, SALVATORE, Dott, Viale Buozzi 47, Rome, Italy
SCHIMKA, VITTORIO, M D, via Corti 3, Trieste, Italy
SCHJELDERUP, HALFDAN, M D, Nesttun near Bergen, Norway
SCHJELDERUP, IDA, MRS
SCHMID, EDUARD, M D, Boheimstrasse 37, Marienhospital, Stuttgart, Germany
SCHMID, ILSE, MRS
SCHMID, HANS H, PROF, Univ Frauenklinik, Doberanerstr 141, Rostock, Germany
SCHMID-GUNTER, ISOLDE, MRS
SCHRACK, HELEN F, M D, 216 N 5th St, Camden, N J, USA
SCHREUS, HANS THEO, PROFESSOR, Hautklinik der Med Akademie, Moorenstr 5, Dusseldorf, Germany
SCHRIMPF, HERBERT, Dozent, Univ Frauenklinik, Rostock, Germany
SCHRIMPF, SLAVKA, MRS
SCHRODER, FRIEDRICH, M D, Nordwestdeutsche Kieferklinik, Hamburg 21, Germany
SCHUCHARDT, KARL, M D PROF, Johnsallee 3, Hamburg 13, Germany
SCHUCHARDT, EVA MARIA, DR, MRS
SCHUCHARDT, ANDREW, Student
SCHULZ, HELMUT, DR, Schloss-strasse 29, Berlin-Steglitz, Germany
SCHULZ, URSULA, MRS
SCHWARZ, KARL, Chefarzt, Neumauer 45, Schwab-Hall, Germany
SCHWARZ, GRETEL, M D, MRS
SCHAFER, KARL, DR, Oberlandgarten 3, Berlin-Tempelhof, Germany
VON SEEMEN, HANS, PROF, Stadt Chirurg Krankenhaus Mu-Nord, Hohenzollernstr 140, Munchen 13, Germany
SEITZ, MAXIMILIAM, Str, 43, Munchen 22, Germany
SHAW, DARREL T, Plastic Surgeon, 10525 Carnegie Avenue, Cleveland 6, Ohio, USA
SHAW, RUTH, MRS
SHAW, LINDA, MISS, 10525, Carnegie Ave, Cleveland 6, Ohio, USA
SHAW, MORTIMER W H, F R C S, High Trees, Brownberrie Lane, Horsforth, Leeds, Great Britain
SHAW, MARY, MRS
SHEDD, DONALD POMROY, Ass Prof Dept Surgery, Yale University, New Haven, Conn, USA
SINHA, NARAYAN RABINDRA, M D, Exhibition Road, Patna-1, Bihar, India
SINIGAGLIA, GIACOMO M, M D, Via Boscovich 50, Milano, Italy
SKOOG, TORD, M D, Assoc PROF, Akademiska sjukhuset, Uppsala, Sweden
SKOOG, ANN-CHARLOTTE, MRS
SMET, HERMAN T J, M D, 131, Avenue de Belgique, Antwerp, Belgium
SMILEV, DIMITAR, Doc DR, Skopje-Yugoslavia Medicinski, Fakultet, Yugoslavia
SMYTH, FRANCIS, 23 Baldwin Ave, San Mateo, Calif, USA
SMYTH, MRS
SODERBERG, BERNARD, COL, 2nd General Hospital, Landstuhl, Germany (USA)
SOIVIO, ATSO, DR, Suomen Tynaisen Ristin Plastiikkasairaala, Helsinki, Finland
SOMMER, W, DR, Bunnenstrasse 11 Hamburg 39, Germany
STARK, RICHARD B, M D, 232 East 66th Street, New York 21, N Y, USA
STARK, R, MRS
STEENEBRUGGEN, CHARLES, M D, 8, Rue Henri de Dinant, Liège, Belgium

PALACIO POSSE, MRS
PARIENTE, RICCARDO DR Viale dello Milizie 12 Rome Italy
PEDEMONTE PEDRO V Orthopedic and plastic surgeon, Lazaro Gadea 976 Montevideo Uruguay
PEDEMONTE, MATEOS DE, HORTENSIA MRS
PEER, LYNDON A., M.D., 15 Washington St., Newark 2 New Jersey USA
PEER, RUTH MRS
PEER, ELIZABETH MISS
PEET ERIC W F R C S Nuffield Department of Plastic Surgery Churchill Hospital Oxford, Great Britain
PENTTI AURA A M., Med lic., Kruunuvuorenk. 9 B Helsinki Finland
PERUTZ EDITH M.D., 152 West 58th St., New York 19 N Y., USA
PERKO MILIVOJ M.D., Vorduncteka 3 Ljubljana, Yugoslavia
PERRET PIERE, M D., Av de Rumine 9 Lausanne Switzerland
PERS MICHAEL M.D., Strandboulevarden 35 Copenhagen Ø Denmark
PERS LIS MRS
PETERSEN NORMAN A M Plastic Surgeon 715 Groote Kerk Gebou Adderley St., Cape Town South Africa
PETERSEN MOLLY MRS
PETRÉN TONI MISS Karolinska sjukhuset Stockholm Sweden
PETROV B A PROF Chief surgeon at the Accident Clinic Sklifosovskij Moscow USSR
PICAUD ANDRÉ JUST M D 11 rue de Longchamp Nice France
PIERER, HANS DR., Gestirnergasse 11 Graz Austria
PIERRE, MAURICE, M.D 38 Bd Périer Marseille 8 Bouches du Rhône France
PIERRE, FRANCE, MRS
PIERS JAN H Plastic Surgeon Gerard Terborgstraat 20 I Amsterdam, Netherlands
PITANGUY IVO M D Av Nossa Senhora Copacabana 540 Apt 601 Rio de Janeiro Brazil
PLANAS, JAIME Chief of Plastic Surgery Clinic "A, Medical School of Barcelona Ariban 153 Barcelona Spain
PLOOMEIER, FRANZ Chefarzt, Mittlerestrasse 3 Rüthen (Möhne) Germany
POLYCRATIS GEORGE, M.D 61 Patisson Street Athens, Greece
POLYCRATIS ANGELIKA MRS
PONTÉN BENGT DR., Norrlandsgatan 34 C Uppsala Sweden
PONTÉN ULLA BRITT MRS
VON POPPEN ANATOL, PROF., M.D Graf Moltkestr 47 Bremen Germany
POTTER, JOHN F R C S York House 198 Bishopton Road Stockton-on Tees Great Britain
POTTER, BETTY MRS
PRADE, FRANCISCO PLASTIC SURGEON, Calle I 206 Vedado Havana, Cuba

RAGNELL, ALLAN M.D., ASSOC PROF Birger Jarlsgatan 62 Stockholm Ö Sweden
RAGNELL, EYVOR, MRS
RANDÉN ANDREW LAS TANDL., DR., Tessins väg 6 Malmö Sweden
RÉCAMIER JAQUES-ANTHELME M.D., 1 rue du Regard Pari 6e France
RÉCAMIER GENEVIÈVE MARIE, MRS
REES THOMAS D., Plastic Surgeon 528 E. 87th Street New York City 28 N Y., USA
REES NATALIE, MRS
REESE, JOHN D., PROF M.D 2037 Locust St Philadelphia 3 Pa., USA
REHRMANN ALFRED H., Dozent Dept. for Surgery of the Face and Jaws Westdeutsche Kieferklinik Düsseldorf Germany
REICHENBACH ERWIN PROF M.D., Universitäts-Zahn-und Kieferklinik Grosse Steinstr 19 Halle a Saale Germany
REICHENBACH ZWETANKA M.D., MRS
REID DOUGLAS A C., F.R C.S., Field Cottage Lime Avenue Duffield Derbyshire Great Britain
ROBERTSON ELBERT L S M.D., Paradise Pasture San Fernando Trinidad British West Indies
RODE, BORIS, DR. MED., Landeralle 27 Charlottenburg 9 Berlin Germany
ROENEN LEONIE DR., Hospital St Pierre, Bruxelles Belgium
ROGERS BLAIR O., M.D., 32 East 35th Street, New York City 16 N Y., USA
ROMERO ROBERTO J Edificio "E. Zaccour" 8 piso 820 Cali, Colombia
ROMIEU CLAUDE, M.D PROF 3 Rue Ste Croix Montpellier France
ROMIEU PAGEZY MARCELLE, MRS

WALKER, DENNIS H, F R C S, 12 Durris Road, Forest Town, Johannesburg, South Africa
WALKER, SONIA E, MRS
WEBSTER, JEROME P, PROF. EM, Columbia-Presbyterian Medical Center, 620 West 168th St, New York 32, N Y, USA
WEBSTER, JEROME P, MRS
WEBSTER, JEROME P, JR, MASTER
WEBSTER, G HARTLEY D, MASTER
WEBSTER, GERALDINE McA., MISS
WEETER, JOHN C, M D, 1206 Heyburn Bldg, Louisville, Kentucky, USA
WEETER, ANNE, MRS
WEETER, MABEL, MRS
WELLS, WARNER, M D, Dept of Surgery, University of North Carolina, Chapel Hill, N C, USA
WENDT, RALF, M D, Hauptstrasse 36, Heidenheim/Brenz, Germany
WHEELER, PHILLIP, MR
WHITE, WILLIAM L, M D, 3700 Fifth Avenue, Pittsburgh 13, Pa, USA
WHITE, WILMA L, MRS
WILDE, N JOHN, 1312 Olive Avenue, Fresno, California, USA
WILDE, CAROL E, MRS
WILLOUGHBY, HOWE, DR, 6331 Hollywood Blvd, Hollywood 98, Calif, USA
WINKLER, ELISABETH, M D, Alserstrasse 21/5, Wien 8, Austria
WODSACK, HANS, M D, Luitpoldstrasse 11 (22b), Neustadt/Weinstrasse, Germany
WOLFSON, LOUIS E, M D, 113 Bay State Road, Boston, Mass, USA
WOLFSON, L E, MRS
WOLTSBURG, A, DR, Germany
WOOD, ARTHUR M, F R C S, Corner House, Hardinge Street, Nairobi, Kenya
WOOD, SUSAN S, MRS
WOUDSTRA, S TH, Surgeon, 31, de Savornin, Lohmanlaan, Arnhem, Netherlands
WOUDSTRA, WILHELMINA J, MRS.
WURTS, MARGARET M, M D, 27 Wellesley Road, Montclair, New Jersey, USA

ZORZOLI, EMANUELE, M D, Via Cesarea No 6, Vigevano (Pavia), Italy

ÖNNE, LARS, DR, Rosenlundsgatan 28 A, Stockholm, Sweden

STEFFENSEN WALLACE H., M D., Blodgett Medical Building, 1810 Wealthy St Grand Rapids 6 Mich., USA
STEFFENSEN W H., MRS
STEFFENSEN KAREN MISS
STEFFENSEN JON E., MR.
STEIN WALTHER, DR., Herzogswall 46 Recklinghausen, Germany
STEINER, ZORA, DR. Rackoga 12 Zagreb Yugoslavia
STEINHARDT GERHARD PROF M D Stadt Krankenanstalten Bremen Germany
STEINHARDT ANNEMARIE M D., MRS
STENBERG TORSTEN M.D., Allmänna sjukhuset Plastikkir avd., Malmo Sweden
STOTZ WILHELM PROF M.D Jung-Stilling Krankenhaus Siegen Germany
STOTZ MARGA MRS
STRAATSMA CLARENCE R., M D., 66 East 70th Street New York 21 N Y., USA
STRAATSMA MRS., 66 East 70th Street New York 21 N Y., USA
STUCCHI GIANFRANCO M.D., Via Locatelli 14 Bergamo Italy
STUTEVILLE, ORION H., PROF M.D., 2722 Thayer Evanston Ill., USA
STUTEVILLE, LUCILLE, MRS.
SUASSUNA JOÃO M.D Fronteiras 194 Recife Pernambuco Brazil
SWITTERS LOUIS M.D., 12 Avenue des Arts Bruxelles Belgium

TAABOR, HENRY DR., 323 Geary Street, San Francisco Calif., USA
TAO HSI, Surgeon Second Medical College Shanghai China
TEAHAN ROSCOE W M.D 5909 Greene Street, Germantown Philadelphia 44 USA
TEICH ALASIA SIMON DR., Via Umberto Cosmo 4, Torino Italy
TESSIER, PAUL, M D., 4 rue de Sontay Paris XVIe France
TESSIER, MICHELINE, MRS
THEISSING GERHARD PROFESSOR, Marschnerstr 14 Ludwigshafen/Rh Germany
THEISSING GRETE, MRS
THEISSING JÜRGEN
THOMPSON JAMES C., 1ST LT., 5th Med. Bn., APO 29 U.S Army Europe (USA)
THORSEN H GUNNAR R., DOC DR MED N Mälarstrand 96 Stockholm, Sweden

TILLEY A ROSS M.D 200 St. Clair Ave. West, Toronto 7 Ontario Canada
TILLEY JEAN D MRS
TRAUNER, RICHARD PROF M D., Schillerstrasse 30 Graz Austria
TRAUNER ANNA, MRS
TROELL, LARS M.D., ASSOC PROF., Karolinska sjukhuset Stockholm 60 Sweden
TROELL, ANNA MRS
TRUCHET PIERRE, M.D., 31 Route de Lyon, Chambery (Savoie) France
TRUCHET CLAUDE, MRS
TRUSLER, HAROLD M., PROF M D 408 Hume Mansur Building, Indianapolis Ind., USA
TUBIANA RAOUL, M.D., 47 Quai des Grands Augustin Paris 6 France

UHRICH KURT M.D., Kaiserdamm 25 a Berlin-Charlottenburg 9 Germany
UHRICH CÄCILIE, Krankengymnastin MRS
ULLIK RUDOLF PROF M.D Schwarzspanierstrasse 4 Wien IX Austria

VAAS JOSEF DR., Krankenheimstrasse 1 Augsburg Germany
VANCIL, GORDON Q., M.D., 104 Division Street Elgin Ill., USA
VANCIL, ULLA BRITT MRS
VELANDER ERIK DR., Serafimerlasarettet Stockholm, Sweden
VELANDER, LIZZIE MRS
VELHAGEN KARL, PROF M.D Heinzelmannweg 12 Leipzig S 3 Germany
VILAR-SANCHO BENITO M.D., P Rosales 66 Madrid Spain
VILAR-SANCHO PILAR, MRS
VIÑAS, JOSÉ C., M.D., Uriburu 1053 2° A, Buenos Aires Argentina
VISETTI MARIO M.D., via Cibrario 27 Torino, Italy
VISJNEVSKIJ ALEXANDER, PROF M.D., Novo-slobodskaia 57/65 Moscow USSR
VOGELER, FERDINAND DR., Düsseldorfstrasse 159 Düsseldorf Germany
VOGL, AUGUST DR Grillchaussée Glückstadt/Elbe, Germany

WAKEFIELD ALAN R., F.R.C.S 59 Collins Street Melbourne, C 1 Australia
WAKEFIELD MARY MRS

Section II

The Scientific Program

I

BURNS

A. Symposium on Burns

Introduction to Symposium on Burns. TRUMAN G BLOCKER, JR, M D *, *University of Texas Medical Branch, Galveston, Texas, U S A*

Surgical thinking with regard to the treatment of burn casualties has changed considerably within the last ten years since the closing days of World War II By that time the pressure dressings devised by Koch and Allen had completely supplanted tannic acid and other varieties of chemical eschar therapy, which had been officially abandoned by the military in 1942 Emphasis was beginning to be placed upon general supportive care rather than upon local measures, but the rationale of whole blood transfusions for red cell replacement had not been generally accepted, and stress had been placed upon restoration of plasma loss during the acute phase of treatment Systemic chemotherapy had been restricted to the sulfonamides at first and later to small doses of penicillin The application of sulfonamide preparations to burn surfaces, which had been practiced rather commonly both in Great Britain and in our own country for a time, was being discontinued because of marked sensitivity reactions and renal complications

Progress in basic and clinical research on burns has received tremendous impetus as a result of the atom bomb explosions of Hiroshima and Nagasaki and the more recent atomic weapon developments Our understanding of fundamental physiological and chemical derangements produced by thermal trauma has been augmented, for example, by research into the phenomena of stress *per se*, determination of the primary effects of irradiation and of experimental flash burns, and studies with relation to the characteristics of human epithelium *in vitro*, histochemical changes in burned skin, mechanisms producing burn anemia, fluid and electrolyte imbalance, and alterations in nitrogen metabolism in particular These and other projects have been facilitated by advances in medical instrumentation and by the use, in some instances, of radioactive compounds as research tools Therapeutic advances have been made with respect to plasma volume expanders, oral hypotonic solutions, bacteriological and chemical laboratory methods, broad-spectrum antibiotics, nutritional therapy, earlier excision and grafting, homograft skin banks, local wound care, and treatment of acute renal insufficiency

* Chairman of the Symposium

Introduction au Symposium sur les Brulures. TRUMAN G BLOCKER, JR

La façon de pensée chirurgicale concernant le traitement d'urgence des brûlures a considérablement changé au cours des dernières années, c'est-à-dire depuis les derniers jours de la seconde guerre mondiale A cette époque, les pansements compressifs préconisés par Koch et Allen avaient complètement supplanté l'acide tanique et tous les autres traitements de type chimique visant à la formation d'eschares, traitement qui avait été officiellement abandonné par les militaires en 1942 On a commencé à insister sur les soins de soutien générals plutôt que sur les mesures locales, mais les raisons qui plaidaient en faveur des transfusions de sang total en vue du remplacement des globules rouges n'avaient pas été acceptées d'une façon générale et on avait insisté sur le rétablissement de la déperdition plasmatique au cours de la phase aigue du traitement La chimiothérapie générale s'est trouvée restreinte d'abord aux sul-

adas debido a las frecuentes reacciones de sensibilidad y a las complicaciones renales

El progreso en la investigación tanto básica como clínica sobre quemaduras, ha recibido un ímpetu tremendo como resultado de las explosiones atómicas en Hiroshima y Nagasaki y los desarrollos recientes en armas atómicas Los daños fisiólogicos y químicos fundamentales producidos por el trauma térmico, estan en el momento actual mejor comprendidos como por ejemplo, la investigación del fenomeno del Stress Per-se, determinación de las efectos primarios de las quemaduras por irradiación y por flama, y estudios en relacion con las características in vitro, cambios histoquímicos en la piel quemada, mecanismos que producen anemia, desequilibrio hídrico y electrolítico así como alteraciones en el metabolismo del nitrógeno, Esta y otros proyectos han sido facilitados en la instrumental médica y por el uso, en algunas ocasiones, de compuestos radioactivos como instrumentos de investigación Se han obtenido adelantos terapéuticos con respecto al plasma, soluciones orales hipotónicas métodos de laboratorios bacteriológicos y químicos, antibióticos de amplio espectro, terapia nutrucional, extirpación de teidos y aplicación temprana de injertos, bancos de injertos homologos de piel, ciudado local de la herida, y tratamiento de la insuficiencia renal aguda

---

Principles of Management of Extensive Burns. Curtis P Artz, Lt Colonel, MC, Robert P Hummel, 1st Lieutenant, MC and Bruce G MacMillan, Captain, MC , *Surgical Research Unit, Brooke Army Medical Center, Houston, Texas, Fort Sam Houston, Texas, U S A*

The intelligent management of the extensive burn involving over 40 per cent of the body surface requires the utmost in professional skill and care and an understanding of electrolyte and fluid balance, respiratory physiology, bacteriology, surgical technic, wound healing, nutrition and psychotherapy

An extensive burn is an overwhelming injury, and the best chance for survival is offered by a team of people rather than an individual surgeon In many instances, the surgeon is confronted with an extensive burn and feels that he can care for the patient until time for grafting, and then refer him to a plastic surgeon Such management is frequently followed by infection, chronic anemia, weight loss, wounds that are not débrided, or heaping granulation tissue

The Surgical Research Unit of the Brooke Army Medical Center is an organization staffed by a team of people whose primary mission is the management of the burned patient During the past six years more than 800 burned patients have been hospitalized and treated

Certain principles in the management of the extensively burned patient have evolved It is the purpose of this presentation to outline pertinent facets of the care of the severe burn

Immediate Care

Transportation. It is a common fallacy that a recently burned patient is too sick to be moved Our experiences in the movement of recently burned patients have shown that physiologic derangements grow progressively worse after injury, therefore the patient does not tolerate prolonged transportation as well after 48 hours as he does during the first 24 hours Patients *may be transported several hundred miles* by air during the first 24 hours without deleterious effects providing fluid and electrolyte requirements are fulfilled in transit The burned patient's chance for survival is much better if he is transported to an institution where facilities and skill are available for expert care

Control of pain Pain is not a prominent feature of a deep burn However, a small dose of morphine given intravenously is most helpful It eliminates apprehension, helps make the patient more comfortable and prepares him for cleansing of the burn wound Extreme uncooperativeness and mania are caused by cerebral anoxia secondary to peripheral circulatory collapse One or two units of a colloidal solution infused rapidly corrects the hypovolemia and results in a cooperative and docile patient

Replacement therapy Immediately after a patient is admitted and weighed, blood should be drawn with a large needle for crossmatching and routine laboratory determinations The initial infusion of electrolytes and colloids can be given in the same needle

A venous lifeline is most essential This may be accomplished either by a cut-down cannula or by a femoral cannula In many instances, it is difficult to find a suitable vein for the insertion of a cut-down cannula In such cases, a femoral cannula is most beneficial and provides a means for more accurate supportive

famides puis à de petites doses de pénicilline L'application de préparations sulfamidées sur les surfaces brûlées qui avaient été d'usage courant aussi bien en Grande-Bretagne que dans notre pays pendant un certain temps fut interrompue à cause de réactions de sensibilité et de complications rénales importantes

Des progrès dans les recherches tant cliniques que de base sur les brûlures ont reçu une impulsion importante à la suite des explosions atomiques de Hiroshima et de Nagasaki et des developpements plus récents des armes atomiques Notre compréhension des troubles fondamentaux tant physiologiques que chimiques produits par le traumatisme thermique s'est trouvée accrue par exemple à la suite de recherches sur le phenomène de stress considéré en lui même sur la détermination des effets primitifs des brûlures par irradiation et par flash experimental et à la suite des études portant sur les caractéristiques de l'epithélium humain in vitro sur les modifications histo-chimiques au niveau de la peau brûlée sur le mécanisme responsable du liquide des brûlures et du déséquilibre électrolytique et sur les troubles du métabolisme azoté en particulier Ces projets et beaucoup d'autres se sont trouvés facilités par un perfectionnement du matériel médical et par l'emploi dans quelques cas de composés radioactifs en tant qu'instrument de recherche Des progrès thérapeutiques ont été faits en ce qui concerne les substances entraînant l'augmentation du volume plasmatique les solutions hypotoniques administrables par la voie buccale les méthodes de laboratoire tant dans le domaine de la bactériologie que de la chemie les antibiotiques à large spectre d'action la thérapeutique nutritionnelle l'excision et la greffe précoce les banques d'homogreffe de peau le soin local des brûlures et le traitement de l'insuffisance rénale

(Section de Médecine de l'Université du Texas Galveston, Texas U.S.A.)

Einführung in ein Symposion über Verbrennungen. TRUMAN G BLOCKER, JR.

Die chirurgischen Überlegungen hinsichtlich der Behandlung von Brandverletzten hat sich während der letzten 10 Jahre seit dem Ende des zweiten Weltkrieges erheblich geändert Damals hatten die vonKoch und Allen angegebenen Druckverbände die Tanninsaure und andere Arten chemischer Verschorfungsbehandlungen vollkommen ersetzt. Die letzteren wurden offiziell 1942 von den Militärbehörden aufgegeben. Der Nachdruck begann auf die allgemein unterstützende Versorgung statt auf die örtlichen Massnahmen gelegt zu werden. Die Bedeutung der Vollbluttransfusion als Ersatz roter Blutzellen war jedoch noch nicht allgemein anerkannt und der Nachdruck wurde darauf gelegt, Plasma Verlust während der akuten Phase der Behandlung zu ersetzen.

Die allgemeine Chemotherapie war zunächst auf die Sulfonamide beschränkt und später auf kleine Dosen von Penicillin Die lokale Behandlung der Verbrennungsflächen mit Sulfonamiden die ziemlich allgemein in Gr Britannien und auch in unserem eigenen Lande eine Zeitlang üblich war wurde wegen der ausgesprochenen Sensibilisierungsreaktionen und der Nierenkomplikationen aufgegeben

Der Fortschritt in der Grundlagenforschung und den klinischen Untersuchungen der Verbrennungen hat einen enormen Antrieb durch die Atombombenexplosionen auf Hiroshima und Nagasaki und die jüngste Entwicklung der Atomwaffen erhalten. Unsere Kenntnis der fundamentalen physiologischen und chemischen Störungen die durch thermische Traumen erzeugt werden wurde erweitert, z.B durch die Erforschung des Stress-Phänomens an sich durch die Feststellungen der Frühwirkung bei Strahlungsund experimentellen Flammenverbrennungen und durch das Studium der Charakteristica menschlichen Epithels in vitro der histochemischen Veränderungen der verbrannten Haut sowie der Mechanismen welche Verbrennungsanämie Flüssigkeits- und Elektrolyten-Gleichgewichtsstörungen und Veränderungen im Stickstoff-Stoffwechsel erzeugen Diese und andere Arbeitsprogramme wurden durch medizinische Apparaturen und in einigen Fällen durch den Gebrauch von radioaktiven Verbindungen als Forschungsmittel erleichtert Therapeutische Fortschritte wurden gemacht bezüglich Plasmavolumen Vermehrung hypotonische *Lösungen* (per os) bakteriologische und chemische Laboratoriumsmethoden breitspektrige Antibiotika Ernährungstherapie frühe Wundexzision und Plastik, Hautbanken (Homotransplantate) örtliche Wundversorgung und die Behandlung akuter Niereninsuffizienz

Introduccion al Simposium sobre Quemaduras. TRUMAN G BLOCKER, JR

La conducta quirúrgica en relación con el *tratamiento de las quemaduras ha cambiado considerablemente* en los últimos diez años desde el final de la segunda guerra mundial. En aquel tiempo los vendajes compresivos descritos por Koch y Allen relevaron completamente a la Terapia por el ácido tánico y otras variedades de *escara química, qué habían sido oficialmente* abandonadas por el ejército en 1942 Se comenzó a dar énfasis al tratamiento general en vez delas medidas locales pero las transfuciones sanguineas para la restauración de eritrocitos no había sido generalmente aceptada, optándose por restituir el plasma perdido durante la fase aguda del tratamiento La quimioterapia sistemática había sido restringida a las sulfonamidas al principio y más tarde a pequeñas dosis de penicilina.

La aplicación del preparaciones de sulfonamidas a las superficies quemadas que habían sido practicadas comunmente en La Gran Bretaña y tambien en nuestro país por un tiempo fueron descontinu-

neum are especially suited to exposure. Partial-thickness burns of the hand do as well when exposed as when dressed. However, full-thickness burns of the hands can be grafted earlier if a dressing has been applied The functional position of the hand can be maintained better with a dressing

It is difficult to expose deep circumferential burns because as an eschar is forming on one side, the other side of the body may become macerated The general trend in previous years has been to dress circumferential burns Dressings have one major disadvantage in an extensive deep burn They must be changed frequently enough to keep the burned surface dry and free of purulent drainage Frequent dressing changes and anesthesia add to the trauma Therefore, in an extensively burned patient it is easier on the patient if his wounds can be treated adequately by the exposure method

Use of the Stryker frame Exposure of circumferential burns may be accomplished by placing the patient on a Stryker turning frame One side of the body is exposed for two hours and then the patient is turned so that the other side is exposed By frequent turning, a protective eschar forms on the circumferentially burned surface The patients who are exposed in this fashion are more comfortable than those who are dressed They require more immediate nursing care on the ward but less total care because of the elimination of dressing changes

The Stryker frame is not only useful in the early management of a burned patient who is exposed but it is also of considerable value throughout the entire period of convalescence[5] It facilitates gentle handling and turning of the patient A patient need not be lifted in order for him to use the bedpan It is much easier to change the linens The frame is on wheels and can be moved easily from place to place The use of the frame permits the patient to be taken to the operating room without transferring him to a cart, thus minimizing trauma and discomfort during the period when multiple skin grafting procedures are being performed

Removal of Eschar

In some burns, the dead skin of a third degree area may be excised immediately after injury and replaced immediately, or a few days later, by grafting However, an extensively burned patient is not in a condition to have his eschar excised until after the second week. Deep burns of 40 per cent of the body surface probably do best if the eschars are allowed to remain until spontaneous separation begins They are removed then by cutting the fibrous bands that attach the eschar to the underlying tissue Sometimes this can be accomplished without anesthesia The use of moist saline soaks is of considerable value in hastening the eschar to loosen

It appears that the aim in the extensive burn should be to remove the eschar and prepare the recipient site for grafting as early as possible However, trauma and stress from anesthesia and surgical excision of extensive areas seem to cause some patients further injury

Skin Grafting

Although there are several methods used to obtain skin for grafting, the electric dermatome offers numerous advantages.[6] With this instrument, long, thin sheets of skin can be cut rapidly The donor sites heal readily, making possible earlier utilization of the same areas for additional skin Due to the great flexibility of the instrument, otherwise inaccessible areas can be used for donor sites The instrument is also of considerable value in obtaining cadaver skin

In general, most areas should be covered by sheets of skin if adequate donor sites are available When skin is limited, greater coverage may be accomplished if the skin is applied in postage-stamp fashion Grafts need not be sutured in place, except in special areas of motion, such as around joints Grafts are held in position by an immobilizing large, bulky pressure dressing

Homografts In extensive deep burns, sufficient skin is usually not available from the patient for immediate coverage When a large area requires grafting, a portion of it may be covered by available autografts and the remainder by cadaver homografts[7] This procedure provides immediate protection against invasive infection, diminishes fluid loss, and may be lifesaving

It appears that postmortem homografts remain in place about as long as homografts from living donors Both may offer a protective covering for the wound for as long as 40 days

A 13-gauge needle is inserted into the femoral vein and a measured segment of polyethylene tubing is placed through the needle and into the inferior vena cava The needle is removed and the cannula is allowed to remain in the vein As soon as the patient has an adequate oral intake the tubing should be removed

Care must be taken that the segment of the tubing is measured before it is inserted and again after it is removed This procedure prevents a portion of the tubing from being lost in the vein in case it should break off Every four hours 1.0 per cent aqueous heparin solution should be instilled in the catheter to prevent clotting at the tip

After an accurate appraisal of the extent of injury a formula may be used to estimate the amount of electrolyte and colloid therapy required during the initial period Considerable experience has shown that the Brooke formula [1] based on percentage of body surface burned and weight of the patient is satisfactory

The final judgment as to rate and type of solutions administered should be based upon the clinical response of the patient. More rapid administration of fluids is required if the blood pressure is falling and the urinary output falls below 30 cc per hour However it is not true that the greater the flow of urine the better the therapy Fluid leaks from the vascular compartment as it is infused The interstitial space will become excessively expanded if sufficient quantities of fluid are given in order to maintain a urine flow of *more* than 50 cc per hour

Fluid therapy during the second 24 hours is usually continued with colloids electrolytes and water in quantities sufficient to maintain a satisfactory output of urine and a serum sodium that does not exceed 140 mEq/L.

Fluid therapy after 48 hours is of great importance in an extensive burn During the period from the third to the twelfth day critically burned patients frequently experience difficulty in fluid and electrolyte imbalance. During this period, the serum sodium seems to be the best guide to therapy rather than the urinary output. An adequate amount of free water must be given intravenously to make sure that the serum sodium does not rise to high levels in the range of 150 to 160 mEq/L.[2] Such an elevated serum sodium concentration indicates hypertonicity of the interstitial fluid The hypertonicity of the fluid may withdraw water from the cells and lead to intracellular dehydration

Resorption of edema fluid in extensively burned patients may require several days During the prolonged period of diuresis the insensible water loss appears to be in the magnitude of 1500 to 2000 cc per day During this period, when the sodium load that was given during the first 48 hours is being excreted, electrolyte-free water should be given in sufficient quantities to maintain a dilution of the serum sodium of about 135 mEq/L.[3]

Tracheotomy A tracheotomy should be performed for respiratory deep face and neck burns This assures an airway eliminates difficult respirations and facilitates tracheobronchial toilet Later the tracheotomy provides an excellent and safe means of administering anesthesia During the operative procedures that are necessary to graft a burn of the face, anesthesia is greatly facilitated by the use of the tracheotomy tube

Antibiotic therapy It seems that routine antibiotic therapy is indicated in the severe burn Prophylactic therapy should be started as soon as possible and the intravenous route is preferred Good prophylactic coverage is provided by a combination of 1,000,000 units of penicillin and 1 gram of streptomycin given intravenously every 12 hours This amount should be given until intravenous therapy is discontinued when 600,000 units of procaine penicillin and 1 gram of streptomycin should be started intramuscularly twice a day If there is inadequate control of infection the selection of the appropriate antibiotic may be made in accordance with the sensitivity of the bacteria that colonize the burn wound Routine tetanus prophylaxis should also be given

The Exposure Method in Severe Burns

During the past six years more than 500 burned patients have been treated by the exposure method Many patients have had certain areas exposed and the other dressed. Other burn patients have been treated entirely by occlusive dressings. From this experience there have evolved certain concepts of the use of exposure.[4] *Most partial thickness burns do well when exposed.* All burns of the face and peri-

neum are especially suited to exposure Partial-thickness burns of the hand do as well when exposed as when dressed However, full-thickness burns of the hands can be grafted earlier if a dressing has been applied The functional position of the hand can be maintained better with a dressing

It is difficult to expose deep circumferential burns because as an eschar is forming on one side, the other side of the body may become macerated The general trend in previous years has been to dress circumferential burns Dressings have one major disadvantage in an extensive deep burn They must be changed frequently enough to keep the burned surface dry and free of purulent drainage Frequent dressing changes and anesthesia add to the trauma Therefore, in an extensively burned patient it is easier on the patient if his wounds can be treated adequately by the exposure method

Use of the Stryker frame Exposure of circumferential burns may be accomplished by placing the patient on a Stryker turning frame One side of the body is exposed for two hours and then the patient is turned so that the other side is exposed By frequent turning, a protective eschar forms on the circumferentially burned surface The patients who are exposed in this fashion are more comfortable than those who are dressed They require more immediate nursing care on the ward but less total care because of the elimination of dressing changes

The Stryker frame is not only useful in the early management of a burned patient who is exposed but it is also of considerable value throughout the entire period of convalescence [5] It facilitates gentle handling and turning of the patient A patient need not be lifted in order for him to use the bedpan It is much easier to change the linens The frame is on wheels and can be moved easily from place to place The use of the frame permits the patient to be taken to the operating room without transferring him to a cart, thus minimizing trauma and discomfort during the period when multiple skin grafting procedures are being performed

Removal of Eschar

In some burns, the dead skin of a third degree area may be excised immediately after injury and replaced immediately, or a few days later, by grafting However, an extensively burned patient is not in a condition to have his eschar excised until after the second week Deep burns of 40 per cent of the body surface probably do best if the eschars are allowed to remain until spontaneous separation begins They are removed then by cutting the fibrous bands that attach the eschar to the underlying tissue Sometimes this can be accomplished without anesthesia The use of moist saline soaks is of considerable value in hastening the eschar to loosen

It appears that the aim in the extensive burn should be to remove the eschar and prepare the recipient site for grafting as early as possible However, trauma and stress from anesthesia and surgical excision of extensive areas seem to cause some patients further injury

Skin Grafting

Although there are several methods used to obtain skin for grafting, the electric dermatome offers numerous advantages [6] With this instrument, long, thin sheets of skin can be cut rapidly The donor sites heal readily, making possible earlier utilization of the same areas for additional skin Due to the great flexibility of the instrument, otherwise inaccessible areas can be used for donor sites The instrument is also of considerable value in obtaining cadaver skin

In general, most areas should be covered by sheets of skin if adequate donor sites are available When skin is limited, greater coverage may be accomplished if the skin is applied in postage-stamp fashion Grafts need not be sutured in place, except in special areas of motion, such as around joints Grafts are held in position by an immobilizing large, bulky pressure dressing

Homografts In extensive deep burns, sufficient skin is usually not available from the patient for immediate coverage When a large area requires grafting, a portion of it may be covered by available autografts and the remainder by cadaver homografts [7] This procedure provides immediate protection against invasive infection, diminishes fluid loss, and may be lifesaving

It appears that postmortem homografts remain in place about as long as homografts from living donors Both may offer a protective covering for the wound for as long as 40 days

A 13-gauge needle is inserted into the femoral vein and a measured segment of polyethylene tubing is placed through the needle and into the inferior vena cava The needle is removed and the cannula is allowed to remain in the vein As soon as the patient has an adequate oral intake the tubing should be removed.

Care must be taken that the segment of the tubing is measured before it is inserted and again after it is removed This procedure prevents a portion of the tubing from being lost in the vein in case it should break off Every four hours, 1.0 per cent aqueous heparin solution should be instilled in the catheter to prevent clotting at the tip

After an accurate appraisal of the extent of injury a formula may be used to estimate the amount of electrolyte and colloid therapy required during the initial period Considerable experience has shown that the Brooke formula[1] based on percentage of body surface burned and weight of the patient is satisfactory

The final judgment as to rate and type of solutions administered should be based upon the clinical response of the patient More rapid administration of fluids is required if the blood pressure is falling and the urinary output falls below 30 cc per hour However it is not true that the greater the flow of urine the better the therapy Fluid leaks from the vascular compartment as it is infused. The interstitial space will become excessively expanded if sufficient quantities of fluid are given in order to maintain a urine flow of *more* than 50 cc per hour

Fluid therapy during the second 24 hours is usually continued with colloids electrolytes and water in quantities sufficient to maintain a satisfactory output of urine and a serum sodium that does not exceed 140 mEq/L

Fluid therapy after 48 hours is of great importance in an extensive burn During the period from the third to the twelfth day critically burned patients frequently experience difficulty in fluid and electrolyte imbalance During this period, the serum sodium seems to be the best guide to therapy rather than the urinary output. An adequate amount of free water must be given intravenously to make sure that the serum sodium does not rise to high levels in the range of 150 to 160 mEq/L.[3] Such an elevated serum sodium concentration indicates hypertonicity of the interstitial fluid. The hypertonicity of the fluid may withdraw water from the cells and lead to intracellular dehydration

Resorption of edema fluid in extensively burned patients may require several days During the prolonged period of diuresis the insensible water loss appears to be in the magnitude of 1500 to 2000 cc per day During this period, when the sodium load that was given during the first 48 hours is being excreted electrolyte free water should be given in sufficient quantities to maintain a dilution of the serum sodium of about 135 mEq/L.[3]

Tracheotomy A tracheotomy should be performed for respiratory deep face and neck burns This assures an airway eliminates difficult respirations and facilitates tracheobronchial toilet Later the tracheotomy provides an excellent and safe means of administering anesthesia During the operative procedures that are necessary to graft a burn of the face, anesthesia is greatly facilitated by the use of the tracheotomy tube.

Antibiotic therapy It seems that routine antibiotic therapy is indicated in the severe burn. Prophylactic therapy should be started as soon as possible and the intravenous route is preferred Good prophylactic coverage is provided by a combination of 1 000,000 units of penicillin and 1 gram of streptomycin given intravenously every 12 hours This amount should be given until intravenous therapy is discontinued when 600,000 units of procaine penicillin and 1 gram of streptomycin should be started intramuscularly twice a day If there is inadequate control of infection the selection of the appropriate antibiotic may be made in accordance with the sensitivity of the bacteria that colonize the burn wound. Routine tetanus prophylaxis should also be given.

The Exposure Method in Severe Burns

During the past six years more than 500 burned patients have been treated by the exposure method. Many patients have had certain areas exposed and the other dressed. Other burn patients have been treated entirely by occlusive dressings. From this experience there have evolved certain concepts of the use of exposure.[4] Most partial-thickness burns do well when exposed. All burns of the face and peri-

10 Protein depletion is minimized when a palatable high-protein supplement is used

REFERENCES

1 Reiss E Stirman J A, Artz C P Davis, J H, and Amspacher, W H Fluid and electrolyte balance in burns J A M A, 152 1309 (Aug 1) 1953
2 Soroff, H S, Artz C P, Pearson, E, and Reiss, E Relationship between serum sodium concentration and state of hydration of the burned patient To be published
3 Artz C P and Soroff, H S Modern concepts in the treatment of burns J A M A, 159 411 (Oct 1) 1955
4 Artz, C P, Reiss E Davis J H, Jr and Amspacher, W H The exposure treatment of burns Ann Surg, 137 456 (April) 1953
5 Davis, J H Jr, Artz, C P, Reiss, E and Amspacher W H Practical technics in the care of the burn patient Am J Surg, 86 713 (Dec) 1953
6 Davis, J H Evaluation of dermatomes Surgery, 36 92 (July) 1954
7 Artz, C P, Becker, J M, Sako, Y, and Bronwell, A W Postmortem skin homografts in the treatment of extensive burns Arch Surg, 71 682 (Nov) 1955
8 Artz, C P, Bronwell, A W, and Sako, Y The exposure treatment of donor sites Ann Surg, 142 248 (Aug) 1955
9 Hamburg, D A, Artz, C P, Reiss, E, Amspacher, W H, and Chambers, R E Clinical importance of emotional problems in the care of patients with burns N Eng J Med, 248 355 (Feb 26) 1953

Principe du Traitement des Brûlures Etendues. CURTIS P ARTZ, ROBERT P HUMMEL AND BRUCE G MAC MILLAN

Les brûlures profondes intéressant de larges zones de la surface cutanée nécessitent pour guérir des soins très spécialisés Les principes importants dont on doit tenir compte sont les suivants

1 Le transport précoce n'est pas contre-indiqué

2 Une sonde veineuse à demeure est indispensable pour mettre en oeuvre une thérapeutique de substitution adequate

3 Les formules standard sont utiles pour apprecier les besoins en lipides, mais le traitement devra être modifie en se basant sur les réactions cliniques

4 La trachéotomie est essentielle pour le traitement des malades porteurs de brûlures de la face, du cou et de l'arbre respiratoire

5 La penicilline et la streptomycine devront constituer le traitement antibiotique prophylactique initial mais si l'infection persiste d'autres antibiotiques seront utilises selon les besoins

6 L'appareil de Stryker constitue un appoint utile dans le traitement des brûlures étendues particulierement quand on met en oeuvre la méthode d'exposition à l'air

7 Les escharres doivent être enlevées aussi rapidement que possible sans pour cela faire inutilement souffrir le malade

8 L'utilisation du dermatome électrique et l'exposition à l'air des lieux de prélevement facilitent et simplifient fortement le problème de la fermeture des plaies

9 Les homogreffes prélevées sur le cadavre peuvent dans les cas de brûlure étendue permettre de sauver la vie des malades

10 La carence en protéines se trouvera réduite quand on administre au malade un supplément riche en protéine et de bon goût

Die Prinzipien der Behandlung von ausgedehnten Verbrennungen. CURTIS P ARTZ, ROBERT P HUMMEL UND BRUCE G MAC MILLAN

Hochgradige Verbrennungen ausgedehnter Korperbezirke erfordern besondere Pflege und Behandlung, um gute Erfolge zu erzielen Wichtige Prinzipien, die dabei beachtet werden mussten, sind

1 Fruhzeitiger Transport ist nicht kontraindiziert

2 Intravenose Infusion ist zum ausreichenden Flussigkeitsersatz unerlasslich

3 Sogenannte physiologische Losungen sind zweckmassig zur Befriedigung des geschatzten Flussigkeitsbedarfes Im Einzelfall muss jedoch die Behandlung den klinischen Erfordernissen angepasst werden

4 Tracheotomie ist unerlasslich bei der Behandlung von Patienten mit Verbrennungen des Gesichts, des Halses und der Atmungsorgane

5 Penicillin und Streptomycin werden als anfangliche prophylaktische antibiotische Therapie empfohlen Wenn hiermit Infektionen nicht unter Kontrolle gebracht werden konnen, sollten andere Antibiotica je nach Indikation angewendet werden

6 Der "Stryker-frame" ist ein wertvolles Hilfsmittel bei der Behandlung ausgedehnter Verbrennungen, insbesondere, wenn die offene Wundbehandlung angewendet wird

7 Brandschorfe sollten so fruh wie moglich entfernt werden, ohne dabei den Patienten einer ubermassigen Belastung auszusetzen

8 Die Anwendung des Elektro-Dermatoms und die Freilegung von Entnahmestellen erleichtern und vereinfachen das Problem des Wundverschlusses erheblich

9 Von Leichen entnommene Homotransplantate konnen bei ausgedehnten Verbrennungen lebensrettend sein

10 Proteinverarmung kann auf ein Minimum reduziert werden, wenn ein hochwertiges schmackhaftes Proteinpraparat gegeben wird

As the homografts separate skin again becomes available from the patient's previously healed donor sites

Exposure of donor sites For many years the accepted method of management of donor sites has been to apply occlusive dressings As long as the donor area is kept free from infection healing occurs Bacterial proliferation is not uncommon under a dressing that becomes warm and moist and results in delayed healing In extensive burn donor areas interspersed between infected granulating surfaces make it difficult to use an adequate occlusive dressing.

During the past three years more than 2 000 donor sites have been exposed.[8] Upon removal of the skin, the donor area is covered with dry fine-mesh gauze and a hot moist laparotomy pad is applied until hemostasis is achieved. At the end of the operative procedure this pad is removed and the area is exposed to the air Within 24 hours a coagulum forms from the blood that has collected in the interstices of the fine-mesh gauze This serves as a protective covering for the wound and healing progresses beneath this coagulum. As epithelization occurs the protective covering falls off leaving a well healed surface in 10-20 days

Supportive Nutritional Therapy

The aims in nutritional therapy in the extensively burned patient are to *minimize depletion* in the early stages after burning and later to provide repletion of protein Recent studies reveal that during the first month after burning these patients lose approximately a pound of weight per day despite an intake of 2-3 grams of protein per kilogram of body weight and 30 calories per gram of protein To minimize this depletion a palatable high-protein between-meal supplemental liquid should be used. If the patient is cooperative and the mixture is a palatable one, a considerable additional quantity of protein can be given each day throughout the entire period of convalescence

When the nutritional aims cannot be accomplished by voluntary oral intake complete alimentation can be supplied by the use of a high-protein high-caloric liquid feeding given through a nasogastric tube Intragastric tube feedings should be withheld until after the first postburn week, because severely burned patients usually have a gastro-intestinal atony Vomiting and aspiration are not uncommon complications of tube feedings that are given in the immediate postburn period

Psychotherapy

Although the patient may compensate physiologically after severe burn there are serious emotional disturbances to which he is subject.[9] The patient is aware of the threat to his survival and the possibility of permanent physical damage and disfigurement. Frequent anesthetics and surgical procedures as well as prolonged physical discomfort during convalescence tend to cause emotional instability

Every effort should be made to reassure the patient and gain his confidence Any additional stress of a psychological nature should be removed and every effort should be maintained to give the patient added impetus in his will to live

Summary

Deep burns involving extensive areas of the body surface require specialized care and management for their successful outcome Important principles to be considered are

1 Early transportation is not contraindicated.

2. A venous cannula is essential for adequate replacement therapy

3 Formulas are helpful in estimating fluid requirements but therapy should be altered on the basis of clinical response.

4. Tracheotomy is essential in the management of patients with burns of face neck and respiratory tree.

5 Penicillin and streptomycin are recommended as initial prophylactic antibiotic therapy If infection is not controlled, other antibiotics should be used as indicated.

6 The Stryker frame is a valuable adjunct in the management of extensive burns, especially when the exposure method is used.

7 Eschars should be removed as rapidly as possible without subjecting the patient to undue stress

8 The use of the electric dermatome and the exposure of donor sites greatly facilitate and amplify the problem of wound closure

9 Cadaver homografts may be lifesaving in extensive burns.

as hopeless casualties following atomic explosions and given only palliative treatment apart from those designated for vigorous therapy, without the effects of radiation the percentage in this group might be increased to 70 per cent, depending upon the number of casualties and the availability of supplies and personnel The remainder of burns should be divided by an experienced physician, if possible, into two categories for emergency treatment, transportation and hospitalization according to the following priorities

1 Critically burned patients with deep burns involving more than 20 per cent of the body surface

2 Seriously burned patients with deep burns of 10 per cent to 20 per cent of the body surface, deep burns of the hands or lower extremities of lesser extent, or superficial burns of greater extent

If other severe injuries are present, as for example avulsion wounds, head injuries, major lacerations, penetrating wounds of the thorax and abdomen, compound fractures, and injuries to large vessels, treatment of these lesions should take precedence over therapy of burns, except for acute respiratory tract involvement necessitating tracheotomy

Supportive Therapy

Patients with major burns which are amenable to treatment should have as soon as possible at the sorting station emergency sedation (with barbiturates or small doses of morphine, 8–10 mgm intravenously, preferably, if in severe shock and conscious) and intravenous colloid therapy Isotonic saline, dextrose in saline, or dextrose in water may be used temporarily or in the absence of plasma, dextran or other plasma volume expanders If the peripheral veins are not available and experienced personnel is at hand, a small polyethylene catheter may be inserted into the femoral vein through a large needle and threaded into the inferior vena cava to avoid repeated cut-down procedures The tip is kept patent by instillation of 1 cc of heparin every 4 hours

Burn shock differs from other types of clinical shock by the added factors of external plasma loss, decrease in circulating red cells (perhaps to the extent of a severe hemorrhage), and formation of burn edema, which depletes the circulation of protein, water, and sodium Blood is the replacement fluid of choice but is not likely to be at hand Electrolyte solutions alone without colloid therapy are likely to pass rapidly into the interstitial fluid because of its increased osmolarity and produce wide-spread edema and even pulmonary embarrassment The most that can be said for these solutions is that they are better than nothing

Since it is impossible in patients with upper extremity burns to ascertain the blood pressure, the state of shock must be gauged by the general appearance, the pulse, the urinary volume, and the response to resuscitative measures. In all severe patients, therefore, it is important to insert a catheter into the bladder as soon as feasible in order to measure the average hourly output at least in 4-hour periods

Various formulas have been devised to serve as a guide for parenteral fluid therapy, based upon body weight and extent of involvement The National Research Council in America recommends for the first 24 hours 1 cc of colloid (blood, plasma, and/or substitutes) for each per cent of body surface involved by the weight in Kgm (not to exceed 4000 cc) The Brooke Army Medical Center Surgical Research Unit has prepared a convenient pocket fluid calculator which may serve also as a general guide The more severe patients (above 20 per cent) should receive an equal amount of isotonic saline alone or with dextrose or with ⅙ sodium lactate (not to exceed 4000 cc) and 1500 cc of 5 per cent dextrose in water to replace insensible loss As a substitute for intravenous electrolytes if unavailable and in less severe burns (under 20 per cent) oral hypotonic saline-sodium bicarbonate solution should be used for the first 48 hours (1 teaspoonful of salt and one-half teaspoonful of bicarbonate of soda to each quart of water) to supply sodium and prevent water intoxication No food or other liquids should be given for 24 hours

Urinary output should average between 25 to 75 cc per hour Greater amounts indicate too vigorous fluid therapy Smaller amounts indicate either too little fluid or the possibility of renal failure Rapid infusion of 1000 cc of colloid solution should result in a significant increase if kidney function is adequate

Fluid therapy should be evaluated at intervals of 12 hours during the first 48 hours after injury

Principios en el del Manejo de Quemaduras Extensas. CURTIS P ARTZ, ROBERT P HUMMEL Y BRUCE G MACMILLAN

Las quemaduras profundas que comprenden áreas extensas de la superficie corporal requieren cuidados y manejo especializados para su tratamiento Los principios importantes a considerar son

1 El transporte precoz no esta contraindicado

2. La canalización venosa es esencial para una terapia adecuada de reemplazo

3 Las fórmula ayudan en la estimación de los requerimientos de fluidos pero la terapia debe ser modificada basandose en la respuesta clínica.

4 La traqueotomía es indispensable en pacientes con quemaduras de la cara cuello y árbol respiratorio

5 La penicilina y la estreptomicina se recomiendan como terapia antibiótica profiláctica inicial Si no se controla la infección deben usarse otros antibióticos que esten indicados

6 La armazón contra golpes es un auxiliar valioso en quemaduras extensa principalmente cuando se usa el método abierto

7 Las escaras deben retirarse lo mas rapidamente posible sin exponer al paciente a esfuerzo innecesario

8 El uso del dermatomo eléctrico y la exposición de zonas donadoras grandes facilitan y simplifican el problema del cierre de las lesiones

9 Los homoinjertos de cadáver pueden ser una medida salvavidas en quemaduras extensas

10 La disminución de las proteinas es reducida *por medio de un suplemento adecuado de proteinas* altas por ingesta

---

Mass Disaster Treatment of Burns. TRUMAN G BLOCKER, JR. M D *University of Texas Medical Branch Galveston Texas U S A*

As we have been endeavoring to lower the mortality rate and lessen the morbidity period in acute extensive burns by increasing our basic and technical knowledge we have been faced also with the necessity of planning for the handling of massive numbers of victims of a major burn catastrophe—revising our minimum standards for adequate care and setting up criteria for proper triage so that patients burned beyond critical levels will not receive priority treatment. In the event of atomic warfare we must take into account the possibility of hundreds of thousands of casualties with multiple injuries of every variety and with all degrees of sublethal radiation damage

Omitting for the purposes of this discussion the logistic problems associated with a disaster of great magnitude which are formidable and perhaps insurmountable we feel that there should be formulated a simple concise burn therapy regime which can be carried out by lay personnel working under medical supervision during the early emergency period

The atomic burn is characteristically a flash burn produced by heat of great intensity and very short duration largely radiant and with high ultraviolet visible and infrared components Pathologically it is identical with the conventional types of flash burns due to explosion of extremely volatile substances. Like them it occurs only on exposed skin surfaces or where clothing is adherent and may be avoided by suitable covering or by intervening mechanical protection. Certain precautionary measures are hence within the realm of possibility given sufficient warning and great enough distance from the bomb center to escape fatal irradiation, blast and ordinary traumatic injuries On the other hand there is experimental evidence that severe burns lower individual resistance to total body irradiation so that death may result from lesions of much less serious nature than those encountered in ordinary civilian and military practice

TRIAGE

Although it is impossible for even the most experienced burn specialist to distinguish at first examination between complete thickness loss of skin in the absence of charring and deep partial thickness loss, nevertheless it is not difficult for non professional personnel to classify burn patients as *mild* or *severe* in both degree and extent.

At the same time record should be made of their location at the time of injury so that irradiation effects may be calculated rapidly The most convenient method of calculating the percentage of burns is the "Rule of Nine," which serves also as a guide for fluid replacement therapy Patients with first-degree burns (erythema and edema) and with superficial second degree burns of less than 10 per cent of the body surface (blisters, weeping, no evidence of shock) should be dismissed for outpatient or self-care after decontamination unless serious accompanying injuries are evident or unless the hands or lower extremities are affected. At the other extreme, patients with deep burns of 50 per cent or more of the body surface should be considered

extremely useful in the recent Bennington Disaster If sufficient materials are at hand, however, and the physician in charge is familiar with burn problems, all lesions may be dressed with the exceptions noted since the most important factor in local care as we discovered in our Korea experiences is the enthusiasm of the man in charge

Once applied, dressings of the hand should be changed in 48 hours, at which time exposure therapy may be employed, with the fingers still maintained in the position of function and the extremity elevated During the first ten days other dressings should not be changed unless they become saturated Thereafter they must be changed every 3 to 4 days at least Meanwhile on exposed areas burns should be inspected daily, and if cracks appear in joint areas or at the margins, the dead tissue should be debrided and the raw surface covered with a single-layer patch of gauze moistened with sterile saline solution If the extremities are not involved, patients on exposure may be ambulatory as soon as the general condition permits

Exposure must not be employed in old burns with open granulations It is applicable for a period of approximately 3 weeks only, at which time the coagulum must be excised mechanically and preparations made for skin grafting

Burn Centers

During the first week after injury, when the shock-edema phase has subsided, the treatment of burn patients will be greatly facilitated if they can be sent to burn centers properly staffed and equipped for definitive surgical procedures Here patients with deep extensive circular burns should be relatively isolated and handled with aseptic precautions Exposure patients may be placed in open wards Since many problems arise with respect to evaluation of depth of burns, chondritis, local and systemic infection, anemia, postassium deficiency, nutritional status, etc , burn consultants should be made available to supervise the work of younger surgeons

In preparation for skin grafting of full-thickness burns necrotic tissue should be removed mechanically between 14 and 21 days with the aid of macerating agents, such as petrolatum-impregnated gauze or with wet dressings of normal saline In burns of the face the eschar should not be excised but should be treated with soaks Grease-gauze and wet dressings are also indicated for chronic open burn wounds If available, the one-piece standard burn pad may be used on these patients, it can be changed daily in a few minutes' time with a minimum of discomfort to the patient

At the first grafting procedure, as much raw area as possible should be covered, using free-hand or dermatome grafts cut into smaller sheets or strips of skin Deep pinch grafts are absolutely contraindicated since they render donor areas unfit for further use Donor sites should be dressed with a bulky absorptive type of bandage for 48 hours, after which they may be treated with only a single layer of fine-mesh gauze

At the present time it would not appear practical to stock-pile cadaver homografts in skin banks since burns of more than 50 per cent of the body surface would in all probability be considered in the hopelessly wounded category if accompanied by radiation damage If a solution could be found to the problem of permanent homograft take, which at the moment appears unlikely in spite of continued research efforts, then of course we might adopt a less radical method of triage and contemplate saving the lives of thousands of patients burned above critical levels

Conclusion

During the Korean conflict the importance of surgical research units attached to MASH hospitals was well demonstrated, and we believe that preparations should be made in the event of a major burn disaster to set up technical research laboratories which can be flown in quickly to serve with a small attached contingent of patients In this way only can scientific data be collected quickly for the benefit of a large group of burn workers and in anticipation of perhaps even greater catastrophes Such a unit would serve also as testing ground for theories which are at the present time unproved and which could not be solved by mass techniques

As a final word, we hope desperately not to be faced with the problem of treating burn casualties Our only chance for survival, however, may lie with an organized system of prior planning along the principles of good military surgery and logistics

During the second 24 hours approximately one-half of the amount of fluid will be required after which intravenous therapy will not be required as a matter of routine unless blood becomes available for treatment of anemia The catheter should be removed about the 4th day

In the presence of renal failure fluid administration must be restricted to insensible loss and salt withheld

Tetanus prophylaxis should be given as a matter of routine to all casualties either in booster doses of .5 to 1 cc of toxoid to those previously immunized or in the form of tetanus antitoxin 3000 units after appropriate skin tests and in divided injections

Prophylactic chemotherapy should be given for a period of at least one week if supplies are available either in the form of oral broad-spectrum antibiotics (500 mgm every eight hours) or as parenteral penicillin every 12 to 24 hours depending upon the type of preparation Thereafter every attempt should be made to treat infections with the specific antibiotics indicated

Local Therapy

Despite the fact that no single routine of burn care can be recommended for all types of lesions certain standards can be set up which require a minimum of personnel during the emergency phase of treatment Conventional pressure dressings have no place in disaster treatment since they require great skill for proper application and may produce serious injuries if handled by inexperienced personnel

Occlusive dressings of two types are recommended first a layered cellulose burn pad measuring 22" x 30" or 22" and 18" with a fine-mesh gauze surface to be applied directly to the burned area, and to be held in place by a semi-elastic roller bandage applied gently to produce even resilient compression second as an alternate ordinary dry fine mesh gauze to be held in place with loose-roller bandage

The exposure method an old technique revived by Wallace and first employed by our army hospitals six years ago has proven to be very useful in burns of the face perineum, and extremities and those restricted to one surface of the body Here burns are exposed uncovered, to the air with necessary bed clothing suspended over gauze or wire supports Within 2 or 3 days a dry coagulum or eschar forms which serves as a protective covering and discourages the bacterial invasion which is often encouraged by moisture and warmth under burn dressings Healing in second-degree burns occurs by desquamation In *full thickness* lesions the eschar during the second week is seen to be depressed and adherent During the third week it becomes somewhat succulent at the margins and must then be removed to avoid serious infection beneath the slough as occurred with tannic acid therapy in many instances years ago The "open and closed methods each have their place and actually complement each other in our present philosophy of therapy

At collecting stations following institution of resuscitative measures all burns should be cleansed of gross dirt by washing gently with detergents and non-sterile fluids minimal debridement may be carried out removing shreds of skin and opening large blebs No topical medication of any kind should be applied Minor burns should be covered with simple dry sterile dressing unless they are extremely mild or located on the face Patients should be covered for transportation to hospitals For this purpose the standard burn pad is ideal but stock piling of bulky dressings may be impossible and home-made substitutes may be devised, or patients may be simply covered with sheets or towels Burns of the hands should be dressed *in the position of function and kept elevated* during evacuation Patients with lower extremity burns should be transported by litter if possible.

For hospital treatment uncomplicated burns of the face and perineum should be treated uniformly by the exposure method Lesions complicated by other injuries should be uniformly dressed after proper debridement either with standard burn pads or with simple dry sterile gauze held in place by a loose roller bandage First priority for burn pads should go to these and second to patients with circular wounds of the trunk or extremities at least for the posterior surfaces which cannot be exposed All wounds which can be positioned so that they may be left open to the air for drying may be treated by the exposure technique Since flash burns occur typically on only one side of the body this method may be applicable in the majority of atomic burns It was found to be

a means of concentrating the treatment under the care of specially trained staff

The Senior Regional Medical Officer, Dr Marshall, circulated the general hospitals inviting them to send their burn children to a Burn Centre for children if they desired to do so

The Centre was formed at Booth Hall Childrens' Hospital Manchester (380 beds)

Triage

1 *Direct admissions* Burned Children who can reach the Unit within one hour of being burned are admitted Direct and received into the Resuscitation Room where this is necessary Police and Ambulance Services can thus bring the patient immediately

2 *Delayed direct admissions* Where patient cannot reach Unit within one hour, the child is taken to the nearest General Hospital, the Medical Staff assess the severity, institute initial treatment and contact Burns Unit by telephone After discussing the pros and cons of transfer certain cases are permitted to proceed to the Unit with I V Therapy running in some cases To my mind if the distance is a long one—30 miles or so—and the child is ill enough to require I V therapy immediate transfer is dangerous, it may be fatal

3 *Delayed admission* The child having been admitted to the General Hospital is not transferred until all shock danger has passed, this may mean a week or more after the accident (See Fig 1)

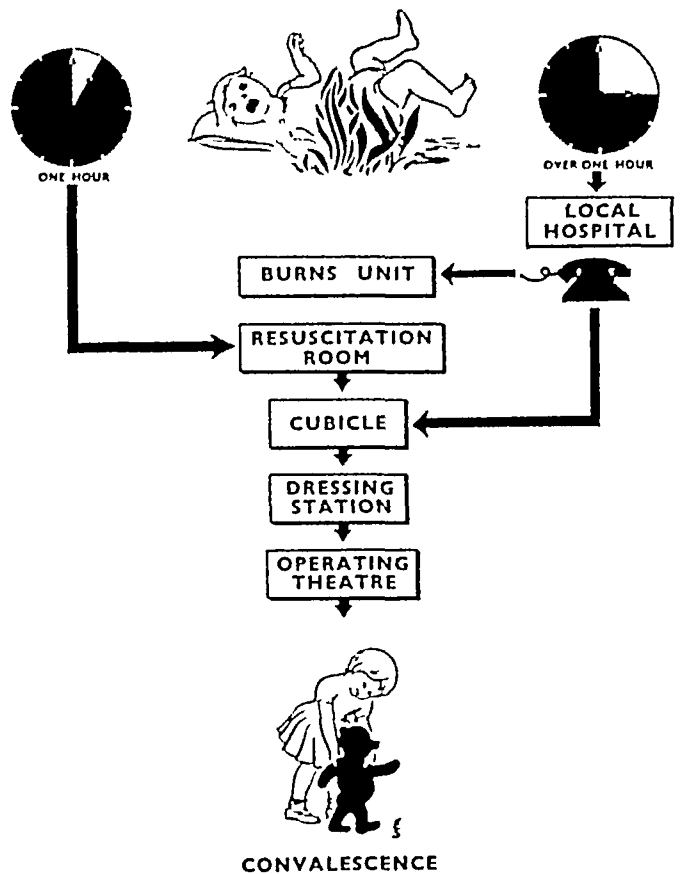


Fig 1

The burns unit

The Unit is situated in one of the blocks on the ground floor of the hospital and there are 19 cubicles for the active stage of treatment In addition there is a convalescent ward of 25 beds which includes a side ward of 6 beds for those under 3 years of age, there are therefore over 40 beds available for burned children

Resuscitation room

The Resuscitation Room is used for recently burned cases It is suitably equipped to allow for fluid replacement and for the initial dressing of the burn It is specially staffed with nurses and therefore the recently burned child is treated as an emergency In this room the initial dressing of the burn can be carried out as well as the intravenous fluid therapy and when the shock period has passed the child is transferred to one of the cubicles By this means cross infection is minimised The room is then prepared for the reception of another case Burns admitted at a later period are not treated in the resuscitation room as it is assumed that they are already infected and therefore should have their first dressing in the operating theatre or in a Burns Dressing Station, these later cases are admitted direct to a cubicle

The theatre

The Theatre recently built situated on the same floor as the cubicles is equipped with air conditioning plant so that purified air can completely change the atmosphere every ten minutes This Theatre is suitable for the performance of any operation and in the absence of a dressing Station can act as such Until a Dressing Station is constructed the Theatre has been used as a Dressing Station for all major burns and by swabbing the surface at each dressing bacteriological control is obtained

Traitement des Brûlures en cas de Catastrophe Interessant de Grandes Masses. TRUMAN G BLOCKER, JR

Sans entrer dans la discussion des problèmes de logistique soulevés par des incendies importants qui sont formidables et peut-être insurmontables l'auteur pense qu'il est nécessaire de formuler un régime de traitement simple et concis des brûlures qui pourra être mis en oeuvre par du personnel profane travaillant sous contrôle médical dans la période qui suivra immédiatement la catastrophe On abordera les problèmes de triage de thérapeutique générale et locale avec quelques suggestions spécifiques pour les malades qui seront classés en (1) cas légers (ils se soigneront eux mêmes) (2) cas graves (3) cas critiques (4) cas sans espoir (traitement palliatif)

Behandlung von Verbrennungen bei Katastrophen TRUMAN G BLOCKER, JR

Ohne auf die mit den Verbrennungskatastrophen verbundenen gedanklichen Probleme die betrachtlich und vielleicht unlösbar sind näher einzugehen glauben wir dass einfache präzise Behandlungsmassnahmen bei Verbrennungen ausgearbeitet werden müssten die in Fällen von Verbrennungskatastrophen grössten Ausmasses auch von Laienpersonal unter medizinischer Überwachung kurz nach dem Unfall als Behelfsmassnahmen ausgeführt werden könnten

Probleme der Frühuntersuchung, der kraftcerhaltenden und lokalen Behandlung werden umrissen mit speziellen Vorschlägen für Patienten, die in (1) leichte (und selbsthilfefähig) (2) schwere (3) kritische und (4) hoffnungslose (palliative Behandlung) eingeteilt werden

Tratamiento de las Quemaduras por Desastre en Masa TRUMAN G BLOCKER, JR.

Omitiendo la discusión de los problemas logísticos asociados con und desastro de quemaduras de gran magnitud que es formidable y tal vez insuperable el autor cree que debe formularse una terapia simple y concisa de las quemaduras que pueda efectuarse por el personal trabajando bajo la supervisión médica durante el periodo precoz de la emergencia Los problemas de (triage) y de terapia local y de soporte deben ser delineados con sugestiones específicas para pacientes clasificados como sigue (1) moderados (2) severos (3) críticos y (4) sin remedio (medidas paliativas)

DISCUSSION

Dr Gunnar Thorsen Stockholm Sweden The problem of plasma volume expanders will be of paramount interest in burn cases because of the amount of blood and plasma needed for substitution in single cases, at any moment, at any place and because of the need of readiness in a mass disaster where blood and plasma banks are either not available or insufficient. Several substances have been used and good reports have been given on the efficiency and nontoxicity of some of them. The results do not yet permit definite conclusions as to which one is the best. One of the most promising is dextran

There are several types of dextran and different opinions about the "ideal" concentrations, molecular size and molecular distribution and so forth As far as I know proofs have not been given to make any definite statements about these questions My own experiences are limited to the Swedish preparations of dextran From these I will state

Even if many questions are still open for discussion we have enough clinical experience to say that the Swedish dextran is efficient as a plasma volume expander and as far as we can judge it is innocuous. We feel safe when we use the Swedish preparation There is to-day in many places a tendency to be extremely blood minded and the arguments are attractive but blood and plasma are peculiar fluids Even if the blood crossmatches perfectly one cannot feel sure that it will match with the patient. I have a feeling that quite a large amount of blood is given to-day that does not give the benefit to the patient which the doctor hopes or supposes

I therefore feel that in cases where there is only moderate blood loss a good volume expander such as dextran is safer and will give as good results In delicate cases with impaired renal function I feel safer with dextran than with blood or plasma as long as the blood loss has been moderate. In burn shock we have had no reason as yet to alter the statement made by Rosenquist and myself that dextran and blood should be given in the ratio 2 1 and in amounts corresponding to the severity of the case and the clinical response

A Regional Burns Unit for Children (Birth to 16 yrs.) ANDREW McDOWALL F R C S *Manchester England*

It was known that at least 500 burnt children were admitted to hospitals in the Manchester Region in one year and the desirability of a central Burns Unit for children appeared to be

covering of penicillin cream The gauze dressing is covered with an absorbent cotton wool and crepe or Kling bandage This dressing is left in position for several days depending upon whether the outer surface becomes moist No compression is used but elevation of the limb is desirable In certain situations such as the buttocks and genital region exposure is used, using the Gallows method of suspension in suitable cases The face is always left exposed, care being taken to see that the eyelids are kept supple with liquid paraffin

In older children much greater use can be made of the open method of treatment Penicillin insufflation is carried out until a firm eschar is formed (It is desirable that the powder comes out in a fine spray) Trunk burns and those of the lower extremities are most suitable for this treatment, but where the burn is circumferential it is difficult to maintain a dry eschar, and therefore one surface should be covered and the position of the child changed frequently so that the under surface does not get moist

Penicillin IM is given to all patients throughout the first week and is continued until the result of swabs shows that the infection is resistant when the appropriate antibiotic is substituted, but this is not continued for longer than a week at a time

Only the first dressing is carried out in the Resuscitation Room and only in those who have been recently burnt prior to admission All other burns have their dressings carried out in the operating theatre under strict aseptic regime and air conditioning A measure of bacteriological control is thus maintained throughout the pre-grafting stage

The localised burn

Prevention of deformity and restoration of function Where there is a localised burned area on the extremities and particularly of the hand the depth of the burn is the decisive factor in treatment Appearance is deceptive for although the area is pale it does not necessarily imply full thickness loss

The pin prick test is used to assess depth

If it cannot be felt then skin destruction is present, and excision is carried out with early split skin graft

If pin prick is felt by the patient then a conservative attitude is adopted On the hand infection soon sets in and interferes with take of the graft unless excision is done early, preferably before the fifth day

On the palm the electric fire bar was a potent cause of such burns, they are always deep and unfortunately rarely present themselves for treatment until infection is well established

The main treatment has then to be carried out after contracture has developed On the face I wait until the slough has separated before applying a graft A reasonably thick graft is possible if the local surface is relatively clean

Very occasionally early excision and skin grafting can be carried out in electric burns on the face including the buccal cavity A successful skin graft was carried out about four days after an electric burn of the lower lip

Recently early excision on the eighth day was carried out on a full thickness burn of the right thigh down to the ankle Two days later the area was grafted with a successful take It is probable that by doing this the stay of the child in hospital will be considerably diminished and the tendency to contracture at the knee obviated

Phase 2

After the fluid balance has been stabilized usually on the third or fourth day and the diuresis established the intra-gastric tube feeding is instituted to off-set the extensive nitrogen depletion and the increased metabolic rate After the first week the hemoglobin percentage is re-determined and the true state of secondary anaemia becomes patent Where there is considerable reduction further whole blood transfusion is given, repeated if necessary to try to keep the hemoglobin level up to 80 per cent if possible During this phase the nursing of the child is most important and everything is done to maintain the morale The education authority supply a trained lady teacher and a Frobel nursing assistant to play with the children as in a cubicle they have not the companionship of other children

Phase 3 Grafting phase

Apart from localised burns which are grafted at an early stage, most burns at this centre have been grafted after the first fortnight and many after the first three weeks when the slough has

Burns dressing station

Plans for a Burns Dressing Station less elaborate than an operating Theatre but air conditioned as the Theatre is have been made and it is hoped that this Station will be constructed this year. When this is constructed it will relieve the pressure on the operating Theatre so that the grafting operations are carried out there rather than the dressing.

The initial treatment of the burned child

The prevention of Burns Shock and treatment if it is already present.

Phase 1. The local treatment of the burn

Wallace's teaching that children who have 9 per cent of body surface area burn or more should be given intravenous fluid therapy has proved a valuable guide in the prevention and treatment of the burn shock. His method of treatment throughout has been based on the amount of fluid lost to the circulation being *proportional to the percentage surface area burn* up to 30 per cent surface area. Should the burn be over 30 per cent then the calculations are based on the weight in kilograms of the child. It has been our practice to calculate the requirements *from Wallace's tables for 48 hours* giving one-third of the required fluid in the first eight hours from the time of the burn, one-third in eight to twenty four hours and one-third between twenty four and forty eight hours. By these calculations about 110 ML intravenous fluid is given per 1 per cent surface area burn. (See Figs. 2 & 3.)

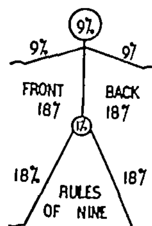


Fig. 2

Experience has led one to believe that for children the *amount* of whole blood recommended in Wallace's table for deep burns may be excessive as in one or two cases excess of whole blood may have contributed to renal damage; this view however is not widely held. In this series of cases plasma was used, not plasma substitute and in one case plasma jaundice developed in a boy of eight years 60 days after plasma, but he made an uneventful recovery.

Children tend *to develop burns shock rapidly* and it is most important where a child is severely burned that the child is retained in the general hospital to which he or she is admitted rather than the child be transported a long distance to the Burn Unit. Even if I.V. Therapy has been instituted during the transport it is very easy for the needle to perforate the small veins of the child and so render the transfusion negligible.

The local treatment of the burn

The type of treatment for the Burn depends on the site of the burn and the age of the child. *In very young children it is better to cover* the burned area including the hand if necessary using an absorbent dressing with or without

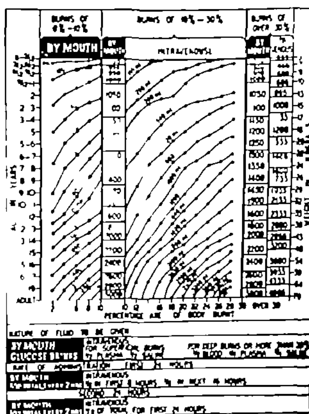
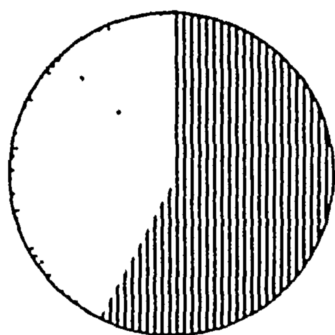


Fig. 3

189 CASES
OVER 10% SURFACE



UNDER 5 YEARS
OVER 5 YEARS
FIG 6

generous advice and help given at all times and his enlightened appreciation of the whole problem of the burned child

To Dr Leonard Colebrook for his advice on the control of cross infection and his recommendations for the construction of a Burns Dressing Station

To the Matron and Nursing Staff through whose careful nursing many lives were saved

To my colleague, Mr Frank Robinson for his vigilant care and much of the treatment

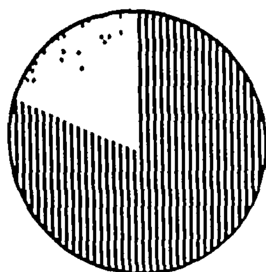
To Dr R Ollerenshawe and Staff of Medical Illustration Department, Manchester Royal Infirmary for excellent photographic plates

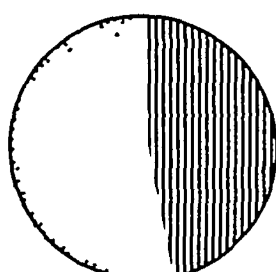
Un Service Régional pour les Brûlures chez L'enfant. ANDREW McDOWALL

ADMISSIONS

1 Directe dans l'heure qui suit
2 Directe retardée

463 CASES





UNDER 3 (236) OVER 3 (227)
SCALDS
BURNS
FIG 7

3 Différée Transfert d'un autre hôpital local quand le danger de choc est passé

HÔPITAL

Chambre de réanimation Uniquement réservée aux admissions directes et à quelques admissions directes retardées Thérapeutique intraveineuse et premier pansement Transfert vers les alcoves (19)

Service de convalescents 25 lits utilisés également pour des cas de chirurgie plastique

Bloc opératoire Air conditionné Appareillage pour changer l'atmosphère toutes les dix minutes Utilisé également comme service de pansement Contrôle bactériologique constant

TRAITEMENT LOCAL

1 Excision précoce et greffe des brûlures localisées aux membres particulièrement aux mains et autour des chevilles et des pieds

Si l'épreuve de piqûre à l'épingle est positive (insensibilité) il est préférable d'exciser avant le 5e jour

2 Brûlures étendues des membres chez les enfants de moins de 5 ans pansement fermé Enfants plus âgés mise à l'air dans le cas où les brûlures ne sont pas circonférentielles

3 Brûlures localisées du tronc mise à l'air Cela est particulièrement recommandé dans les cas d'atteinte des fesses, des organes génitaux et du dos

4 Brûlures de la face préférable de les laisser à l'air Soins des paupières et des yeux

Insufflation de poudre de pénicilline dans le cas de mise à l'air

TRAITEMENT GÉNÉRAL

1 Liquides par la voie intraveineuse dans les brûlures intéressant plus de 9% de la surface corporelle Pénicilline intramusculaire dès le départ et pendant six jours Localement pansement fermé et mise à l'air

2 Commencer dès le 3e et le 4e jour à administrer un régime riche en calories et en protéines Mettre en place une sonde gastrique pour alimentation supplémentaire Emulsion d'huile d'arachide 15 cc-147 calories Fer colloïdal et transfusion de sang Vitamines A, C et D

3 Greffes cutanées (troisième semaine) Dès la chute des escharres et la présence d'une surface saine Des lanières de greffes de Thiersch mises côte à côte Premier pansement le 3e jour

Homogreffs Prendre comme donneur un parent Brûlure de plus de 30% ou quand les lieux de prélèvement sont limités

4 Retour à la maison ou en maison de convalescence Les contractures seront traitées plus tard

Statistiques 458 cas en 18 mois 41% des malades avaient une atteinte de plus de 10% de la surface corporelle, parmi les moins de 3 ans, moins de 5% d'ébouillantés

separated and the surface is sufficiently clean to take a graft.

Preparing the raw surface one has used local antibiotics extensively applied direct to the wound at the time of the dressing I have found that local chloromycetin 5 per cent the most valuable local antibiotic on account of its wide spectrum and its lengthened period of sensitivity Polymyxin B has been most valuable for infection with pyocyaneus infection using the local antibiotic every other day as a rule or every day in severe cases

Skin grafting of young children has remained relatively simple by the use of the electric Dermatome which has been used extensively and the donor sites heal more rapidly and can be used for a second grafting operation at a later date. Homografts are being used for the extensive burns and where the general condition of the child warrants them In my series homografts were used for nine children in all In three instances on two occasions and in one instance two homograft donors were used on two occasions. Donors were found suitable accommodations in the hospital and on the average were able to go home with their donor sites healed after nine days.

All first dressings for grafts were done on the third day after grafting as by this means early infection could be controlled Where homografts were used the alternate strip method of application advocated by Mr Mowlem were found to be most effective

Between first of January 1954 and the 30th of June 1955 458 cases were treated at the centre 66 per cent were under 5 years. (Fig. 4)

Of the same number of cases 41 per cent were over 10 per cent surface area burns (Fig 5.)

Of 189 cases of burns of 10 per cent surface area, 109 were under 5 years and 80 were over 5 years (Fig 6)

Two diagrams are shown of 463 cases, 236 were under 3 years and 227 were over 3 years. Under 3 years show the large predominance of scalds in the first three years of life over 75 per cent. Over 3 years the chances of a scald to a burn are almost equal (Fig 7)

Overall average stay in hospital of all cases including the very severely burned was 30 days.

Mortality figures

Seven died of burns shock average time two and a quarter days nearly all over 60 per cent burns Seven died of infective toxoemia average time 35 days

One died in the first week from pyocyaneus septicaemia one died after 27 days during a skin grafting operation. This child was a 21 per cent burn but in spite of all normal precautions including blood transfusion during the operation, she succumbed after an operation lasting one hour

Of the seven children who died after 35 days it is possible that at least four of them might have been saved if early excision of the burned area had been carried out during the first week.

ACKNOWLEDGEMENTS

To Dr Patterson M D., D C H., Medical Superintendent and Consultant Pediatric Physician Booth Hall Childrens Hospital for his

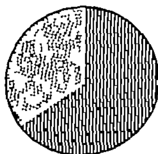


FIG. 4

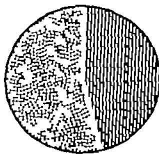


FIG. 5

Estadísticas Cuatrocientos cincuenta y ocho casos en 18 meses, 41% de ellos con más de un 10% de superficie corporal quemada, el 5% de los casos tenían menos de 3 años de edad

---

Early Excision and Grafting of Extensive Deep Burns.

DOUGLAS McG JACKSON, M D, F R C S, *Medical Research Council Burns Unit, Birmingham, England*

INTRODUCTION

The procedure of excision and grafting of extensive deep burns about six or eight hours after injury is primarily an attempt to reduce mortality rather than healing time Our rationale for this treatment is based upon three facts which are evident from a study of patients treated at the Birmingham Burns Research Unit over the last decade

The first of these facts is a tragic one patients who used to die ten years ago are still dying to-day (1, 2) There has been no appreciable improvement in mortality, and there is therefore no place for satisfaction with present methods

The second fact is encouraging the mean survival time of the fatal cases which have a chance of living has been prolonged Though these patients still die, they now live one or two weeks longer before they do so (Table I) In other words, some who used to die in the shock stage now get through this period to present a problem at a later stage

The third fact offers hope, and I think also a pointer for future treatment The commonest cause of death in those patients who had a chance of survival was some type of infection, two thirds of these infective deaths were in the first three weeks after injury (Table II) This preeminence of infection as a lethal agent has

TABLE I PERIODS OF SURVIVAL OF FATAL CASES WITH A CHANCE OF LIVING 1945–1952

Mortality probability as a decimal of 1 0	Period	Mean survival in days
0 — 4	1945–7	13 0
	1948–50	14 9
	1951–2	21 9
5 — 9	1945–7	7 3
	1948–50	16 6
	1951–2	25 0

TABLE II CAUSES OF DEATH IN 87 BURNED PATIENTS (1948–52)

(Excluding those with a mortality probability of 1 0, and those over 70 years of age)

	Cause	Patients
1	Shock and post-shock syndrome (0–5 days)	15 patients (33%)
2	Pneumonia, septicaemia, meningitis and hepatitis	22 patients (49%)
3	Respiratory burns, pulmonary embolus, deaths during operation	8 patients —

(Two-thirds of the infective deaths were in the first 3 weeks)

also been described by Liedberg, Reiss and Artz (3) who reviewed 35 consecutive burn fatalities The causes of death were definitely ascertained in 29 patients, and of these 12 deaths were due to septicaemia, in 4 others septicaemia was strongly suspected but not proved Ample and varied treatment with chemotherapy and antibiotics has failed to lower the mortality appreciably it may be that closing the wound while it is still clean will prove the key to survival

THE TIME OF OPERATION

If early wound closure is desirable, the next step is to decide the earliest safe and practical time for operation About this there are at present two schools of thought Our practice has been to operate 6-8 hours after injury as this is the usual time it takes us to receive and resuscitate the patient, and examine him sufficiently to be sure that his burn is suitable for excision and his overall condition adequate for major surgery Although the operation is carried out during the "shock stage," it must not be upon a shocked patient The other school of thought prefers to wait till about the fourth day before operation, and the reasons for this have been given by Muir in his paper at this Congress This somewhat delayed operation is certainly easier to organise, but the more immediate one is well within the capability of a Burns Unit and, moreover, pays greater attention to the basic principle of operating before there is appreciable bacterial contamination In our experience heavy growths of Staph aureus, Ps pyocyanea and coliform bacilli are frequently grown from the burn surface by the second or third

Eine Regionäre Verbrennungsstation für Kinder ANDREW McDOWALL.

AUFNAHMEN

1 Unmittelbare (innerhalb einer Stunde)
2 Unmittelbare verzögert
3 Aufgeschobene Verlegung von örtlichen Krankenhäusern wenn Schockgefahr vorüber ist

KRANKENHAUS

Wiederbelebung raum nur für unmittelbare und einige unmittelbare verzögerte Aufnahmen Intravenöse Behandlung und erste Wundbehandlung Verlegung in Einzelzellen (19)

Rekonvaleszentensaal 25 Betten der auch für plastische Wiederherstellungsfälle benutzt wird

Operation saal Klimaanlage Die Gesamtluft soll von der Anlage alle 10 Minuten gewechselt werden Auch als Verbandsraum benutzt Durchgehende bakteriologische Kontrolle

ÖRTLICHE BEHANDLUNG

1 Frühes Ausschneiden und Transplantation von begrenzten Verbrennungen der Extremitäten besonders der Hände der Füsse und der Fussgelenke Wenn Nadelstichtest positiv (gefühllos) ist wird besser vor dem 5 Tage exzidiert

2 Bei ausgedehnten Verbrennungen an den Gliedmassen von Kindern unter 5 Jahren geschlossene Verbände bei älteren Kindern offene Behandlung der Brandwunden falls diese nicht um den ganzen Umfang herumgehen

3 Bei begrenzten Verbrennungen am Rumpf offene Behandlung, besonders geeignet für Gesäss Genitalien und Rücken

4 Bei Gesichtsverbrennungen am besten offene Behandlung Lidund Augenfürsorge Penicillinpudergebläse für die offene Wundbehandlung

ALLGEMEINBEHANDLUNG

1 Bei Verbrennungen die mehr als 9% der Körperoberfläche betreffen intravenöse Flüssigkeitszufuhr Penicillin intramuskular anfänglich 6 Tage lang.

Örtlich Wundverbände oder offene Behandlung.

2 Vom 3 und 4 Tage an hochkalorische und hoch proteinhaltige Diät zusätzlich Magensonden fütterung, Nussolemulsion 15 ml 147 Kalorien kolloidales Eisen und Bluttransfusion Vitamin A C und D

3 Hauttransplantation (dritte Woche) sobald Schorfe sich abstossen und die Oberfläche gesund ist Thierschlappen dicht beieinander Erster Verbandwechsel *am dritten Tag*

Homotransplantate Eltern oder Verwandte als Spender Bei Verbrennungen über 30% Körperoberfläche oder in Fällen wo die Entnahmestellen begrenzt sind

4 Entlassung nach Hause oder in ein Erholungsheim Kontrakturen werden in einem späteren Stadium behandelt.

Statistik 458 Fälle in 18 Monaten, davon 41% über 10% Körperoberfläche bei denen unter 3 Jahren mehr als 5% Verbrühungen.

Una Unidad Regional de Quemaduras para Niños. ANDREW McDOWALL.

ADMISION

1 Directo (dentro de la primera hora)
2 Directo demorado
3 Diferido Transportado del hospital local cuando ha pasado el peligro del shock.

HOSPITAL

Cuarto de resucitación Para admisión directa y demorada directa solamente Terápia intravenosa y primera curación Transporte al cubículo

Sala de convalescientes Veinticinco camas Se usa también para casos de cirugía plástica

Cuarto de operaciones Aire acondicionado Planta para cambiar la atmósfera cada diez minutos Usada también como estación de curaciones Control bacteriológico desde el principio hasta el fin

TRATAMIENTO LOCAL

1 Resección precoz e injerto de las quemaduras localizadas en la extremidades particularmente en las manos y alrededor de los tobillos y pies. Si la *prueba de Pin Prick es positiva (insensibilidad)* resecar de preferencia antes del quinto día.

2 Quemaduras extensas de las extremidades en niños de menos de 5 años, metodo cerrado En niños de mas edad método abierto si las quemaduras no son circunferenciales

3 Quemaduras localizadas en el tronco tratamiento abierto Particularmente util para las quemaduras en nalgas genitales y dorso método abierto

4 Quemaduras faciales tratamiento abierto Cuidado de ojos y párpados Insuflación de penicilina en polvo en tratamiento abierto

TRATAMIENTO GENERAL

1 E Líquidos intravenosos en quemaduras de mas del 9% de superficie corporal Penicilina intramuscular por los primeros sei días Curación local abierta o cerrada

2 Al tercero o cuarto día se inicia dieta de contenido calórico y proteínico alto Sonda gástrica para sobrealimentación. Emulsión de aceite de nuez goteado 15 mgs dan 147 caloria Hierro coloidal p transfusión sanguínea. Vitaminas A C D

3 Injerto de piel *(tercera semana) Tan pronto* como se elimine la escara y haya superficie granulante ana Bandas de injertos tipo Thiersch Primera curación al tercer día.

Homoinjertos De parientes o donadores Quemaduras de más de un 30% de superficie corporal o cuando los sitios donadores son limitados

4 Convalescencia en el hogar Las contracturas se tratan en un estadio posterior



FIG 8 This girl of 7 years received a 55% burn, 53% being full thickness loss, when her clothes were set alight from a firework



FIG 9 20% of the body surface has been excised 8 hours after injury leaving some viable subcutaneous tissue over the trunk and as much as possible around the breasts

surface requires excision, alternate strips of autograft and homograft are probably indicated in an attempt to obtain permanent cover for the whole area (Figs 8-11) We have not personally excised larger areas than this on the first day, and we have not performed large excisions without grafting as our aim has been to close or decrease the size of the wound

At present we have only treated about twenty cases in this way so that no significant results can be given It is worth pointing out, however, that there is already evidence that red cell volume measurement is necessary before and after operation on the larger cases In the cases under 25 per cent of full thickness loss, red cell volume studies by Topley (6) agreed closely with the swab weighing results, on the other hand, in the three largest burns, (53, 37, and 35 per cent of full thickness loss), the fall in the red cell mass some hours after the end of operation was much greater than could be attributed to the measured operation loss, and this required replacement according to the measured individual needs of the patient

For burns of less than 30 per cent full thickness loss our impression is that the method is good for bigger full thickness burns than this we are still unable to make any useful comment



FIG 10 The raw area has been covered with alternate strips of autograft and stored homograft Operation time 1 hour 50 mins Blood transfused 1 6 litres

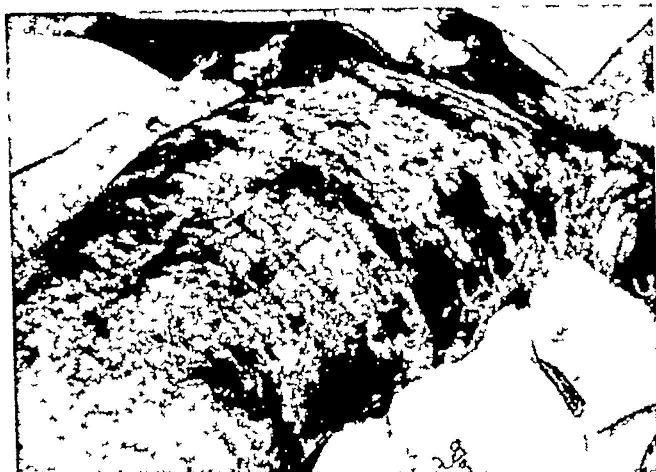


FIG 11 At 8 days the graft "take" was fair, about 80% In spite of a good start, it was six months before healing was complete

REFERENCES

1 Bull, J P, and Squire, J R Ann Surg, 130 160, 1949
2 Bull, J P, and Fisher, A J Ann Surg, 139 269, 1954
3 Liedberg, N C, Reiss, E, and Artz, C P Surg, Gynec Obstet, 99 151, 1954

day after injury and one of our cases of septicaemia died on the fourth day

The better method can only be demonstrated by a controlled clinical trial but the theoretical reasons in favour of immediate operation can perhaps be summarized as follows

1 The patient usually seems fitter for major surgery *immediately after resuscitation* than after 4 days

2 There is less bacterial contamination early on the first day

3 We have already found on several occasions that the complete excision of an extensive full thickness burn terminates the shock stage by removing the leaking capillary bed and there is no further tendency for the haematocrit to rise.

4 The absorption of potassium from the burned tissue into the blood stream is probably less With ideal treatment this is of little importance but in those patients who through late or inadequate treatment receive renal damage it may delay the rise in serum potassium which carries such a dark prognosis

The Technique of the Operation

Our present management of an extensively burned patient starts with putting him between sterilised sheets in a clean shock room setting up a plasma transfusion and restoring the haematocrit to normal in the first hour the amount of plasma required to do this is the least he can require and there may be indications to give it at a faster rate.

During this first hour the burns are usually examined to find whether the depth and distribution are suitable for early excision The pin prick test is used to map out the area of analgesia, and the area that can be assumed to be full thickness loss is then assessed (4)

Studies on red cell destruction in burned patients by Topley (5) have shown that with less than 20 per cent full thickness loss only about 10 per cent of the red cell mass is destroyed and this can be neglected in the shock stage. In burns of over 40 per cent of the body surface and largely full thickness loss the red cell destruction may be 40-60 per cent of the total red cell volume. When more than about 30 per cent full thickness loss is present therefore, the individual red cell requirement of the patient is measured by the Ashby differential agglutination technique or with radioactive phosphorus or chromium and the loss replaced with blood.

Careful observation with hourly haematocrit estimations is continued till the rate of plasma is established and the plasma loss during operation can then be replaced as it occurs.

Oral fluids are stopped four hours before operation and the equivalent amount of 5 per cent dextrose is given intravenously The stomach is emptied to avoid the risk of aspiration during the induction of anaesthesia

During the operation itself swab weighing is carried out and periodic checks are made of the blood lost and transfused frequently we have found that the amount lost and therefore required is once or twice the patient's own blood volume in the case of young children though the proportion is less in adults At first the pallor resulting from chlorpromazine used by the anaesthetists made them feel that more blood was needed than the weighed loss on the swabs but more recently we have been convinced that the weighed loss is a good guide to the patient's *operation* requirements

When the whole of the trunk only is burned the front is excised and the patient nursed supine to facilitate breathing if the limbs are extensively burned they are excised first, as graft "take" on the limbs in our experience is usually better than on the trunk.

The excision itself we have usually done with a Humby knife removing skin and some fat with the first cut and a deeper layer of subcutaneous tissue with a second cut if the exposed fat was red—which is a sign of stasis and future necrosis There is little doubt that there is less blood loss if skin and subcutaneous tissue are removed down to deep fascia but we have felt that the unnecessary removal of normal fat in a condition in which nutrition is such a problem is unwise if blood for transfusion is *unlimited. Bleeding is controlled with diathermy* coagulation and special care is taken to leave all viable subcutaneous tissue in the breast region in little girls who form the majority of these patients

When the area to be excised is less than 15 per cent the whole area can be covered with autografts without difficulty at the same operation If however 20-30 per cent of the body



Fig 8 This girl of 7 years received a 55% burn, 53% being full thickness loss, when her clothes were set alight from a firework



Fig 9 20% of the body surface has been excised 8 hours after injury leaving some viable subcutaneous tissue over the trunk and as much as possible around the breasts

surface requires excision, alternate strips of autograft and homograft are probably indicated in an attempt to obtain permanent cover for the whole area (Figs 8-11) We have not personally excised larger areas than this on the first day, and we have not performed large excisions without grafting as our aim has been to close or decrease the size of the wound

At present we have only treated about twenty cases in this way so that no significant results can be given It is worth pointing out, however, that there is already evidence that red cell volume measurement is necessary before and after operation on the larger cases In the cases under 25 per cent of full thickness loss, red cell volume studies by Topley (6) agreed closely with the swab weighing results; on the other hand, in the three largest burns, (53, 37, and 35 per cent of full thickness loss), the fall in the red cell mass some hours after the end of operation was much greater than could be attributed to the measured operation loss, and this required replacement according to the measured individual needs of the patient

For burns of less than 30 per cent full thickness loss our impression is that the method is good for bigger full thickness burns than this we are still unable to make any useful comment



Fig 10 The raw area has been covered with alternate strips of autograft and stored homograft Operation time 1 hour 50 mins Blood transfused 1 6 litres



Fig 11 At 8 days the graft "take" was fair, about 80% In spite of a good start, it was six months before healing was complete

References

1 Bull, J P, and Squire, J R Ann Surg, 130 160, 1949
2 Bull, J P, and Fisher, A J Ann Surg, 139 269, 1954
3 Liedberg, N C, Reiss, E, and Artz, C P Surg, Gynec Obstet, 99 151, 1954

day after injury, and one of our cases of septicaemia died on the fourth day

The better method can only be demonstrated by a controlled clinical trial but the theoretical reasons in favour of *immediate operation* can perhaps be summarized as follows

1 The patient usually seems fitter for major surgery immediately after resuscitation than after 4 days.

2. There is less bacterial contamination early on the first day

3 We have already found on several occasions that the complete excision of an extensive full thickness burn terminates the shock stage by removing the leaking capillary bed and there is no further tendency for the haematocrit to rise.

4 The absorption of potassium from the burned tissue into the blood stream is probably less With ideal treatment this is of little importance but in those patients who through late or inadequate treatment receive renal damage it may delay the rise in serum potassium which carries such a dark prognosis.

The Technique of the Operation

Our present management of an extensively burned patient starts with putting him between sterilised sheets in a clean shock room setting up a plasma transfusion and restoring the haematocrit to normal in the first hour the amount of plasma required to do this is the least he can require and there may be indications to give it at a faster rate

During this first hour the burns are usually examined to find whether the depth and distribution are suitable for early excision The pin prick test is used to map out the area of analgesia and the area that can be assumed to be full thickness loss is then assessed (4)

Studies on red cell destruction in burned patients by Topley (5) have shown that with less than 20 per cent full thickness loss only about 10 per cent of the red cell mass is destroyed and this can be neglected in the shock stage. In burns of over 40 per cent of the body surface and largely full thickness loss the red cell destruction may be 40-60 per cent of the total red cell volume. When more than about 30 per cent full thickness loss is present therefore, the individual red cell requirement of the patient is measured by the Ashby differential agglutination technique, or with radioactive phosphorus or chromium and the loss replaced with blood

Careful observation with hourly haematocrit estimations is continued till the rate of plasma is established, and the plasma loss during operation can then be replaced as it occurs

Oral fluids are stopped four hours before operation and the equivalent amount of 5 per cent dextrose is given intravenously The stomach is emptied to avoid the risk of aspiration during the induction of anaesthesia

During the operation itself swab weighing is carried out and periodic checks are made of the blood lost and transfused frequently we have found that the amount lost, and therefore required is once or twice the patient's own blood volume in the case of young children, though the proportion is less in adults At first the pallor resulting from chlorpromazine used by the anaesthetists made them feel that more blood was needed than the weighed loss on the swabs but more recently we have been convinced that the weighed loss is a good guide to the patient's *operation* requirements

When the whole of the trunk only is burned the front is excised and the patient nursed *supine to facilitate breathing If the limbs are* extensively burned they are excised first, as graft "take" on the limbs in our experience is usually better than on the trunk.

The excision itself we have usually done with a Humby knife removing skin and some fat *with the first cut, and a deeper layer of sub*cutaneous tissue with a second cut if the exposed fat was red—which is a sign of stasis and future necrosis There is little doubt that there is less blood loss if skin and subcutaneous tissue are removed down to deep fascia but we *have felt that the unnecessary removal of nor*mal fat in a condition in which nutrition is such a problem is unwise if blood for transfusion is unlimited. Bleeding is controlled with diathermy coagulation, and special care is taken to leave all viable subcutaneous tissue in the breast region *in little girls who form the majority of* these patients

When the area to be excised is less than 15 per cent the whole area can be covered with *autografts without difficulty at the same oper*ation. If however 20-30 per cent of the body



Fig 8 This girl of 7 years received a 55% burn, 53% being full thickness loss, when her clothes were set alight from a firework



Fig. 9 20% of the body surface has been excised 8 hours after injury leaving some viable subcutaneous tissue over the trunk and as much as possible around the breasts

surface requires excision, alternate strips of autograft and homograft are probably indicated in an attempt to obtain permanent cover for the whole area (Figs 8-11) We have not personally excised larger areas than this on the first day, and we have not performed large excisions without grafting as our aim has been to close or decrease the size of the wound

At present we have only treated about twenty cases in this way so that no significant results can be given It is worth pointing out, however, that there is already evidence that red cell volume measurement is necessary before and after operation on the larger cases In the cases under 25 per cent of full thickness loss, red cell volume studies by Topley (6) agreed closely with the swab weighing results, on the other hand, in the three largest burns, (53, 37, and 35 per cent of full thickness loss), the fall in the red cell mass some hours after the end of operation was much greater than could be attributed to the measured operation loss, and this required replacement according to the measured individual needs of the patient

For burns of less than 30 per cent full thickness loss our impression is that the method is good for bigger full thickness burns than this we are still unable to make any useful comment



Fig 10 The raw area has been covered with alternate strips of autograft and stored homograft Operation time 1 hour 50 mins Blood transfused 1 6 litres

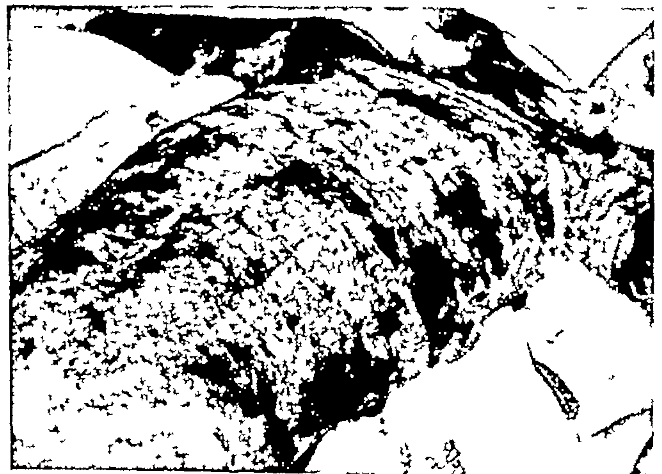


Fig 11 At 8 days the graft "take" was fair, about 80% In spite of a good start, it was six months before healing was complete

References

1 Bull, J P, and Squire, J R Ann Surg, 130 160, 1949
2 Bull, J P, and Fisher, A J Ann Surg, 139 269, 1954
3 Liedberg, N C, Reiss, E, and Artz, C P Surg, Gynec Obstet, 99 151, 1954

4 Jackson, D M Brit. J Surg 40.588 1953
5 Topley E and Davies J In press
6 Topley E Personal Communication

Excision Precoce et Greffe Dans le cas de Brûlure Profonde de Grande Surface DOUGLAS M JACKSON

Ce procédé qui vise à réduire la mortalité et le temps de guérison des brûlures étendues n'est devenu une possibilité de sécurité depuis le développement des techniques pour le contrôle clinique du volume sanguin On discute les indications les avantages et les limites du procédé et on décrit la principale caractéristique de la technique.

Il apparaît actuellement que huit heures après la brûlure on peut pratiquer une excision et une greffe dans les brûlures avec 20 à 25% de perte de peau totale cela étant dans les limites de la technique ici présentée à condition que les précautions adéquates soient prises pour corriger et maintenir le volume sanguin.

Pour les brûlures intéressant plus de 30% de perte de peau totale le meilleur procédé a mettre en oeuvre est plus discutable mais peut comporter l emploi d'homogreffes cutanées

Frühexcision und Transplantation bei ausgedehnten tiefen Verbrennungen. DOUGLAS M JACKSON

Dieses Verfahren das einen Versuch darstellt die Sterblichkeit und Heilungszeit bei ausgedehnten Verbrennungen herabzusetzen bekam erst dann eine gesicherte Möglichkeit nachdem die Technik für die klinische Kontrolle des Blutvolumen entwickelt worden war

Indikationen Vorteile und Grenzen des Verfahrens werden besprochen und die Grundzüge der Technik illustriert.

Gegenwärtig scheint es daß innerhalb von 6 bis 8 Stunden nach der Verbrennung ein erfolgreiches Ausschneiden und Transplantieren von 20 bis 25% des Hautverlustes in voller Dicke wohl im Möglichkeitsbereich der heutigen Technik liegt vorausgesetzt daß ausreichende Sicherheitsmaßnahmen getroffen werden um das Blutvolumen aufrecht zu erhalten

Bei Verbrennungen die zum Verlust von über 30% von Haut in voller Dicke geführt haben unterliegt das bestmögliche Verfahren sehr viel mehr der Discussion mag aber die Verwendung von Homotransplantaten einschließen

Escision Precoz o Injerto de Quemaduras Profundas Extensas. DOUGLAS M JACKSON

Este procedimiento que es un intento para reducir la mortalidad y el tiempo de cicatrización de quemaduras extensas, ha llegado a ser una posibilidad segura desde que se ha desarrollado la técnica para el control clínico del volumen sanguíneo

Las indicaciones ventejas y limitaciones del procedimiento se discuten ilustrandose gráficamente la técnica

Al momento presente parece que dentro del período de seis a ocho horas después de la quema dura la resección o injerto con éxito de un 20 a 25% de pérdidas de piel de todo espesor puede esperarse de ésta tecnica dando una seguridad adecuada para corregir y mantener el volumen sanguíneo

Para quemaduras de mas del 30% de pédida de todo el espesor de la piel el mejor procedimiento es mucho más discutido pero puede incluír el uso de homoinjertos de piel

---

Homografting in Burns and Skin Storage. TORD SKOOG M D, *Akademiska Sjukhuset Uppsala Sweden*

I HOMOGRAFTING

The use of skin homografts in the treatment of the extensively burned has been found to be a most valuable procedure to reduce pain and to prevent fluid loss Several reports have been given by plastic surgeons stating that the operation has been actually life saving This important chapter in the modern care of burns was planned to be an authoritative presentation on this program by Dr S Kirschbaum of Argentina At the beginning of the Congress he notified us however that he was prevented from coming and the chairman has asked me to replace him on this Symposium When I accepted this invitation it was understood that time would not allow me to prepare a thorough review of the subject but that I should limit myself to a report on our clinical experience in this field in Uppsala and summaries of our research on skin storage problems

Since the Plastic Surgery Unit of this University was opened in 1951 it has also served as a centre for burn treatment to which patients from the northern and middle part of Sweden have been referred. During this period we have treated as inpatients about 150 deep burns many of them extensive and admitted a considerable time after the injury in a deteriorated condition.

The general principle of local treatment has been exposure of the burn to the air combined with systemic administration of antibiotics Adopting A. B Wallace's principles in this respect has meant marked improvement in our

results We can enthusiastically support his conclusions on the advantages of this method which he presented in 1952 Bacteriological research on our material (*Korlof 8*) also makes it justifiable to state that the exposure treatment permits better control of infection than other methods In deep burns, skin replacement has been done after primary excision or delayed excision or separation of crusts or excision of exuberant granulation tissue In richly vascularized recipient areas, the grafts were applied after an interval of 24 hours

Homografts have been used in eleven cases In five patients the burn was either too large or the patient too weak for the use of adequate amounts of autografts In these cases homografts proved most beneficial In at least one of them we were inclined to consider the operation as life-saving The homografts survived from 2 weeks to 3 months

A brief report of one case may illustrate the value of homografts

A girl of 4 was admitted with severely infected deep burns of the chin, front of the trunk and abdomen, upper arms and thighs 5 weeks following injury (Fig 12A) Her general condition was very poor and it was considered too dangerous to perform a major operation of cleaning the wounds and immediate coverage with autografts Instead following excision of necrotic tissue and infected granulations, the raw surfaces were covered with fresh homografts from the mother These grafts had a complete take (Fig 12B), and there was marked improvement of the child's general condition in the next two weeks When the homografts liquefied after 13 days (Fig 12C) permanent healing was achieved by autografting in stages (Fig 12D) Following homografting, spontaneous healing occurred on the lower lip and chin causing scar contracture (Fig 12E) This deformity was cured by complete scar excision and replacement of destroyed skin by full thickness postauricular skin grafts (Fig 12F), a protrusion of the ears was corrected at the same time

In conclusion When autografts cannot be used to cover large raw surfaces, the great advantage of applying homografts is indisputable The temporary healing achieved in this way may help the patient over a crucial point in his recovery The relief of pain changes his personality almost from one day to the next giving undisturbed sleep, and the disappearance of infection The cessation of drainage of fluid, electrolytes and protein brings back his appetite and in many cases his will to survive The tendency toward spontaneous healing is increased and the improvement of the patient's general condition may later permit successful autografting when necessary The lessened need for dressings and nursing care should also be mentioned

Our experience with homografting thus confirms the conclusions based on larger case studies given by Jackson (7) and others

II Skin Storage

The demonstrated value of homografting for temporary cover of an extensively burned patient has many practical implications One of the most obvious is the need for storage methods that will allow us to establish skin banks

Since *Wentscher* (12) in 1903 reported the successful grafting of skin preserved at about +10°C up to 22 days conflicting statements regarding viability of stored skin and the effect of low temperature on living cells have been made There are numerous reports of successful grafting of human skin, after storage at about +3°C up to three weeks In 1939 *Mider and Morton* (9) found that rat skin may survive when frozen to −74°C Methods of storage have been discussed by *Billingham and Medawar* (3) *Allgower and Blocker* (1), *Hemphill and Brown* (6) and others

In the last few years we have studied systematically the effect of low temperatures on the viability of excised skin White rats were used as experimental animals The investigation was carried out as comparative studies between the effect of storage temperatures on respiratory activity and the survival of grafts of similarly stored skin Measurements of respiration were by the Barcroft-Warburg micro-method This method gave remarkably reliable results provided there was no bacterial growth

Viability of skin at +3°C

Various techniques for storage were employed and the skin was kept at ordinary refrigerator temperature The determinations showed that full thickness skin of rats stored at +3°C had

FIG 12 A D A girl aged 4 with deep burns. For details see text

a very low rate of metabolism already after one week and that a decrease in respiratory capacity could be up to four weeks After three weeks the vitality was below requirements for successful grafting The most rapid drop in rate of O_2-consumption occurred within a few hours immediately following excision



FIG 12 E and F

Autogenous grafts After one week's storage, the healing capacity of full thickness autografts was reduced to 32 per cent. After two weeks only occasional grafts would take, and after three weeks there were no successful takes. Comparisons of the performance in this biological test with the respiratory rates of the skin in individual cases showed a good correlation between these functions and showed furthermore that when the O_2-consumption was below 0.05 μl O_2/mg dry weight/hr the vitality of the tissue was too low to permit healing

Viability of skin at −70 C

Skin which had been frozen to −70 C and then thawed was almost indistinguishable from *a freshly cut graft This was true irrespective* of whether the storage time had been only a few days or 28 weeks The difference between skin stored in this manner and that which had

been stored only a few weeks in the refrigerator at +3°C therefore was very striking

O_2-consumption The thawed skin, regardless of the length of storage, showed relatively constant O_2-consumption, 0 22-0 012 µl. O_2/mg dry weight/ hr No statistical difference was found between the different experimental series, and there was also good agreement between values of respiration determined after 24 hours of storage and later times up to 28 weeks The values corresponded to those obtained with skin which was excised and stored for less than 12 hours at +3°C All specimens showed respiratory activity

Samples of skin which had been thawed in Ringer solution or in rat serum at +37°C showed no differences in respiration one from the other Skin which had been thawed in air at room temperature on the other hand had somewhat lower O_2-consumption but the difference was not statistically significant Thawing in Ringer solution at +37°C for one minute was selected as a routine procedure as it was the simplest of the two methods which gave the highest average value of O_2-consumption

Freezing down to +70°C for three hours followed by thawing led to a statistically significant decrease in O_2-consumption of the skin as compared with that of skin kept for the same length of time at +18°C

The difference between these two values on the one hand and the O_2-consumption of the skin immediately after it had been excised was also statistically significant The method employed for preservation, therefore, seems to bring about a small but definite decrease in vitality of the skin

In the series where the skin was frozen and thawed twice during 48 hours there was no statistically significant difference in the O_2-consumption but the results suggested that some such decrease in activity probably occurs It is no doubt important that the temperature in the refrigerator be kept constantly below the melting point

Autogenous grafts Results of the autografting experiments showed no statistical differences between the different experimental series and the average take for all of them was approximately 65 per cent (Table 1) No quantitative

TABLE 1 RESULTS OF GRAFTING SKIN STORED AT −70°C IN RATS

Storage time in weeks	Grafted animals	Successful grafts: Takes	Successful grafts: In per cent of animals
1– 2	24	16	67
3– 4	32	16	50
5– 8	20	12	60
9–12	31	23	71
13–16	31	22	71
17–20	17	11	65
Total	155	100	65

or qualitative changes with time that the samples had been deep-frozen could be observed A certain degree of parallelism between the O_2-consumption and viability as judged by the grafting experiments in individual cases could be seen and the results showed unequivocally that the measurements of respiration gave dependable indications of the viability of the skin after storage at −70°C In the successful transplantations the skin healed to a considerable extent and in many cases to 100 per cent As part of the reasons why healing occurred in only about 65 per cent of the cases may be mentioned that skin grafting on rats presents technical difficulties and that special risks are associated with the use of full thickness skin grafts In preliminary operations with fresh skin the takes seemed to be better but no statistical comparison was made in this respect

The healed grafts were often of poorer quality than that of normal skin They were slightly atrophic, and developed less hair The results, however, varied considerably in this respect, and in some cases in the later stages, the grafted skin could hardly be distinguished from normal

Clinical observations

Homografting of human skin stored for 4 or 13 months respectively was successfully done in three cases The grafts were medium-sized, split grafts cut with Brown's electrodermatome or a Humby knife They were stored at −70°C and thawed in Ringer solution at +37°C for one minute The skin could hardly be distinguished from fresh skin after it had been thawed One of these cases will be reported here

A boy aged 6 (blood group O Rh+) suffered a deep circumferential burn of both legs on April 27 1954 and one month later he was transferred to the Plastic Surgery Unit in Uppsala On admission he presented a poor general condition and gross infection of the burned tissue Excision of all necrotic tissue necessitated the exposure of tendons and muscles in some areas For that reason and because of infection the wound was left for granulation After two weeks the wound presented a smooth and granulating surface suitable for grafting.

Operation (TS) June 10 1954 Auto-and homografting of both legs under general anaesthesia

Autografts from available donor areas were only sufficient to cover the lateral and posterior surfaces of the right leg.

The medial surface of the right leg was partially covered with a homograft about 6 x 20 cm leaving an open wound more than one cm wide to the anterior edge of the autograft and to the lower border of the wound The homograft had been cut 4 months before and since stored at −70 C The donor was a 38 year old man (blood group O Rh+) who was grafted for an 8 per cent third-degree burn when he permitted the storage of some surplus skin There was no relationship between donor and recipient

The left leg was covered with fresh homografts taken from the patient's father aged 30 (blood group A Rh+)

At the first dressing after 5 days there was a complete take of all grafts except for some insignificant slough along the edges They all had the same healthy appearance.

The fresh homograft from the father started to show signs of degeneration after one week but in small local areas there was epithelial overgrowth between closely adjacent pieces of skin After two weeks the degenerative changes were distinct and the graft was in a state of dissolution in large area After three weeks the graft had been sloughed off for the most part

The homograft stored at −70 C separated the corneal layer as a continuous sheath in about a week's time In the following two weeks it was very much of the same character as the autograft The wound surfaces along the edges were bridged with epithelium and this outgrowth definitely occurred from both the homograft and the adjacent autograft or normal skin. After 3 weeks degeneration began to show and developed slowly during the following month. After 8 weeks most of the graft and all the new epithelium grown from the edges was dissolved (Fig 13)

Biopsies were made of the autograft and the two kinds of homograft on the ninth postoperative day and specimens taken from area of normal appearance These sections confirmed that there was a sound healing of all the grafts and there was no obvious difference in their microscopic structure (Fig 14)

Apparently skin stored at −70 C might retain its viability for practically unlimited periods of time The storage procedure is simple and does not seem to affect the quality of homografts adversely Therefore it would seem to be the method of choice" in the establishment of skin banks specifically for use in treatment of burns

A complete report of these investigations was published in 1954 (*Skoog* 10) Since then we have also tried to evaluate the common technique for anticrystallization using glycerol as a dialising substance before the skin was frozen and kept at −70 C In these series where the skin was stored from two to nine weeks there was no significant difference in O_2-consumption or take of grafts compared to controls (Fig 15)

Dogo (5) *Brown et al* (4) *Artz* (1) among others have reported the possibilities and advantages of using human postmortem skin homografts in the management of a patient with ex

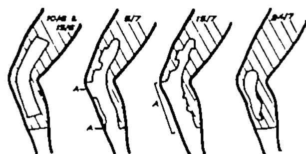


Fig 13 Diagram of deep-frozen homograft in a 6 year boy described in text. A-Growth of epithelium

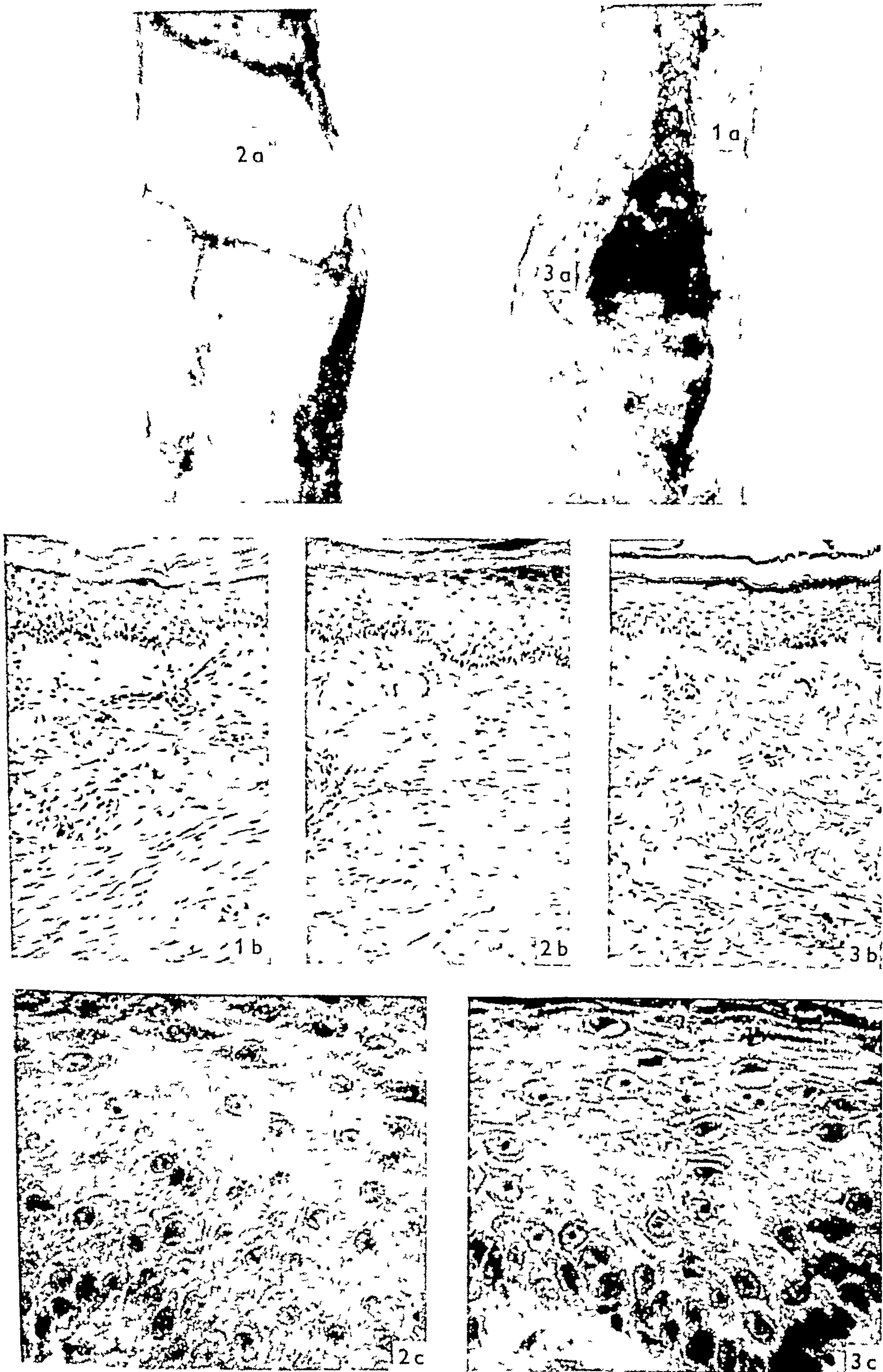


Fig 14 The patient referred to in fig 13 1 a-b—Autograft, 2 a-c—Fresh homograft, 3 a-c—Deep-frozen homograft For details see text

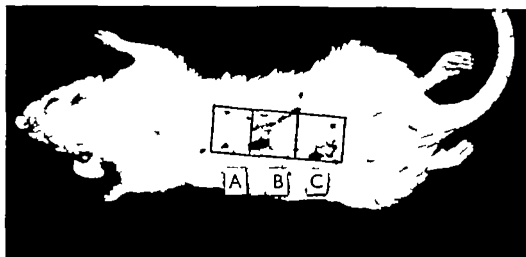


FIG 15 Experiments referred to in text A—Fresh autograft B—Autograft stored after excision at — 70 C C—Autograft dialized in glycerol for 1 hour before storage at — 70 C There was no difference in take among the three grafts

tensive burns Present Swedish laws do not permit the use of postmortem tissues in therapy Therefore we have had no clinical experience in this respect A study of the metabolism of split human cadaver skin has been started however so far skin from 30 cadavers has been studied. The metabolism of these specimens within 48 hours postmortem was in all cases above the level which is required for a good take upon grafting.

REFERENCES

1 Allgöwer A and Blocker Jr T G Texas Rep Biol and Med 10 3 1952
2 Artz C P Brooke Army Med Center Fort Sam Houston Texas U S A Annual Report 1954
3 Billingham R E and Medawar P B J Exper Biol 29 454 1952
4. Brown, J B Fryer M P Randall P., and Lu, M Ann Surg 138 618 1953
5 Dogo G Pl and Recon Surg 10 10 1952.
6 Hemphill, J E., and Brown, J B Plast & Reconstr Surg., 14 118, 1954
7 Jackson, D Brit J Plast Surg 7 26 1954
8. Körlof B Acta Chir Scand Suppl., 209 1956
9 Mider G B., and Morton J J Amer J Cancer 35 502 1939
10 Skoog, T Plast. & Reconstr Surg., 14 403 1954.
11. Wallace A. B Brit. J Plast. Surg., 4 224 1952
12. Wentscher J Deutsche Ztschr f Chir 70 21 1903

Les Homogreffes Dans les Brûlures et les Banques de Peau TORD SKOOG.

Dans le début de son article l'auteur insiste sur l'importance qu'il y a à enseigner les principes modernes de traitement des brûlures dans toutes les écoles de médecine et sur la nécessité de créer un nombre suffisant de services dirigés par des chirurgiens esthétiques en vue du soin des brûlures dans tous les pays.

Illustration de l'homogreffe dans les brûlures étendues en tant que procédé qui permet de sauver la vie des malades et brève description du comportement typique des homogreffes

Compte-rendu résumé sur les recherches expérimentales et cliniques relatives aux possibilités d'exploitage de la peau La vitalité de la peau stockée à des températures variables a été étudiée chez le rat par des mesures quantitatives de la respiration et les résultats ont été confrontés avec la survie des greffes. La vitalité de la peau stockée à +3 C était en-dessous des besoins pour avoir une réussite de greffe après trois semaines alors que la peau stockée à −70 semble conserver sa vitalité pendant des périodes pratiquement illimitées. Des greffes dermo-épidermiques humaines stockées à −70 C pendant 13 mois et greffées en tant qu'homogreffes se sont révélées presque aussi bonnes que des homogreffes fraiches Des mesures relatives au métabolisme de peau excisée de cadavre humain font ressortir que la peau reste encore viable 48 heures après la mort.

Homotransplantation bei Verbrennungen und Haut-Aufbewahrung TORD SKOOG

Zu Beginn betont der Verfasser die Wichtigkeit, die modernen Prinzipien der Verbrennungsbehandlung in allen medizinischen Schulen zu lehren und

eine genugende Zahl von Einheiten fur die Behandlung von Verbrennungen unter der Leitung plastischer Chirurgen in allen Landern zu organisieren

Homotransplantation bei ausgedehnten Verbrennungen wird als lebensrettendes Verfahren durch einen charakteristischen Fall illustriert und das typische Verhalten des Homotransplantates kurz beschrieben

Ein summarischer Bericht uber experimentelle und klinische Forschung in Bezug auf die Moglichkeit der Aufbewahrung von Haut wird gegeben. Die Vitalitat der Haut in verschiedenen Temperaturen aufbewahrt, wurde durch quantitative Messungen der Atmung untersucht und die Ergebnisse mit dem Überleben von Transplantaten verglichen Die Lebenskraft von Haut, die bei +3° Celsius aufbewahrt wurde, erfullt nicht die Bedingungen einer erfolgreichen Transplantation nach drei Wochen, wahrend die bei −70° Cels aufbewahrte Haut ihre Vitalitat fur praktisch unbegrenzte Zeitlangen zu bewahren schien Menschliche Spalthaut bei −70° Cels bis zu 13 Monaten aufbewahrt und dann als Homotransplantat ubertragen, war beinahe so gut wie frische Homotransplantate Stoffwechselmessungen an Ausschnitten menschlicher Leichenhaut zeigte, dass die Haut noch 48 Stunden nach dem Tode lebensfahig bleibt

Homoinjertos en Quemaduras y Conservacion de Piel. TORD SKOOG

Inicialmente el autor enfatiza la importancia de enseñar los principios modernos del tratamiento de las quemaduras en todas las escuelas médicas y la necesidad de organizar en todos los paises unidades en numero suficiente para la atención de las quemaduras por cirujanos plásticos

Los homoinjertos en quemaduras extensas constituyen una medida salvavidas, ilustrandose el procedimiento con un caso característico, describiendose brevemente el comportamiento típico de dichos homoinjertos

Se da un reporte resumido de la investigación clínica y experimental de las posibilidades de almacenar piel La vitalidad de la piel de ratas almacenada a temperaturas diversas, se estudió por medidas cuantitativas de la respiración y los resultados se relacionaron con la supervivencia de los injertos La vitalidad de la piel almacenada a 3 grados C estaba por debajo de los requerimientos necesarios para un injerto co éxito después de tres semanas, en tanto que la piel al macenada a −70 grados C, parecía retener su vitalidad por periodos de tiempo prácticamente ilimitados Los injertos de mediano espesor de piel humana almacenados a −70 grados C por más de trece meses y usados como homoinjertos, dieron tan buenos resultados como los homoinjertos frescos Las medidas del metabolismo de la piel retirada de cadáveres humanos indican que esa piel permanece viable 48 horas después de la muerte.

The Role of the Nervous System in the Development of Burn Disease and Our Method of Treating It.[1] ALEXANDER A VISHNEVSKY, M. D, Professor, *Moscow, U S S R*

The pathogenesis of burn disease and the rational methods of its treatment should be regarded from the standpoint of the primary role of the nervous system in the development of the body's reaction to burn trauma

We stated our views in this aspect of the development and treatment of burn disease at the II Congress of Physicians and Surgeons at Turin in June 1954 Our further investigations and observations conducted in the past year confirmed the truth of the statements we then made

There is no doubt whatever that burn trauma, just as any other external influence, is in the first place received by the nervous system, by its innumerable receptors, and that burn disease as the corresponding reaction of the organism, develops as a reflex through the central nervous system

Nervous reflexes are the origin not only of the shock arising in the first stage of burn disease, but of the burn-caused increase in the permeability of capillaries which initiates the exudation of plasma from vessels and leads to the appearance of oedema The effect of this process on burned patients is to cause the concentration of blood, hypoproteinemia and hypochloremia

The important role of the nervous system, or, more precisely, of its reflex-trophic function in the pathogenesis of burns is confirmed by an experimental series undertaken in the Vishnevsky Surgery Institute in Moscow

In these experiments on animals the majority of the authors applied the protective methods of influencing the nervous system that are employed by us in the treatment of human beings, namely, prolonged medicamental sleep after I P Pavlov and novocaine blockade after A V Vishnevsky

A V Vishnevsky is known to have elaborated several types of novocain blockade lumbar, jugular, encasing, and infiltrative In lumbar blockade a weak 0 25 per cent solution of the drug is injected in doses of 60-100CC into the perirenal fat tissue which holds part of the

---

* Read by Truman G Blocker, Jr, M D

Plexus solaris Plexus renalis and the peripheral trunk of the sympathetic nerve

In jugular blockade the solution bathes the vagus and sympathetic nerves Encasing blockade is applied only on the extremities proximal to the affected site Lastly infiltration consists in sprinkling the tissues with a novocain solution *around the whole circumference of the* pathologic focus

Both medicamental sleep and novocain blockade are methods of influencing the trophic regulating function of the nervous system Their curative effect is most pronounced when the inflammatory process is non-specific and in such diseases where the inflammatory reaction is an important or leading component (burns frost bites infected wounds trophic lesions)

In experiments on animal involving the use of medicamental sleep and novocain nerve blockade we often succeed in avoiding completely or considerably weakening the symptoms of burn disease.

The experimental studies of Bubnov Mukhin and other Soviet authors showed that burns inflicted on animals in a state of medicamental sleep or narcosis does not cause any manifestations of primary burn shock which is the usual case in control animals remaining awake

The experiments on rabbits conducted by our co-workers Dogneva and Itkin had the object of studying the effect of medicamental sleep and novocain blockade on derangements of capillary permeability in cases of burn In the case of a rabbit s ear scalded by submerging for ten minutes in water at a temperature of 60 C a marked increase was observed in the permeability of vessels and capillaries The intravenously injected dye—trypanic blue—found exit into the tissues as soon as five minutes after injection If the burn was inflicted on an animal in a state of medicamental sleep there was either no increase at all in the permeability of vessels or it was very slightly noticeable

In another experimental series a like normalising influence on the burn-caused increased permeability of vessels was exercised by novocain blockade surrounding the aural radix of a rabbit

Similar data on the state of the vascular tonus and capillary permeability were obtained by Mazaev and Shumova in another experiment with the use of roentgen vasography of living subjects. The contrast material was a 40 per cent solution of sergosine The results of the experiments show that burns are followed by marked vasodilatation and increased speed of arterial and venous blood-flow Vessel permeability remained increased for a considerable time

When the burn was received during medicamental sleep *no increase in vessel permeability* was observed

A similar normalising effect was obtained by our co-workers Vilia vin and Shumova by the application of encasing novocain blockade after burns

Thus experiments have confirmed the clinically observed normalising effect of medicamental sleep and novocain blockade on derangement of capillary permeability during burn disease.

Great interest in regard to elucidating the nervous genesis of burn disease is presented by the investigations on patients conducted in our institute by K A Sergeyeva and G D Viliavin. These authors by means of plethysmography established the distortion of conditioned and unconditioned vascular reflexes in burn patients The stimuli used for the experiments were thermal—application of heat and cold—and demonstrations of respective stimuli as well as speech signals such as "hot," "cold The vascular reactions of patients with thermal burns proved to be distorted.

Instead of the normally observed contraction of the vascular lumen a cold stimulus applied to patients with burns in most cases caused vasodilatation A conditioned stimulus—demonstration of heat—and oral signal caused strictly differentiated reactions depending on the nature of the burn. In patients with chemical burns these stimuli caused the normal vasodilatory reaction in patients with thermal burns on the contrary not only the heat stimulus itself but even the sole mention of heat caused an acutely spastic vascular reaction

The distorted vascular reflexes together with other alterations in the nervous system observed during burn disease testify that there is also derangement of nervous processes in the region of the vascular centres Judging by the nature of the changes in vascular reactions to thermal stimuli of different force it may be supposed that in the region of the centres of vascular innervation there occurs an alteration in the

excitability of nerve cells and a development of marked phase conditions. Very significant for maintaining and aggravating such states, is the pathological impulsation from the site of the lesion. Therefore treatment must in the first place be directed towards lowering or completely stopping such impulsation from the periphery.

We consider most rational a method of our own which emphasizes measures for protecting the nervous system. Besides the conventional methods for combating shock such as warming of the patients, analgestic and cardiac preparations, blood transfusion, we attribute considerable significance to bilateral lumbar novocain blockade which we conduct from the very outset.

A large role in the mechanism of the therapeutic effect of novocain blockade is played by its protective influence on the cerebral cortex and subcortex. By altering peripheral reception we obviate cortex stimulation which enhances the normalisation of its trophic function (A. V. Vishnevsky).

Novocain blockade, apart from its strong analgestic and shock preventing influence, increases the vascular tonus and promotes the restoration of normal capillary permeability. This, in its turn, prevents oedema, plasmorrhea, and hypoproteinemia, thereby considerably reducing the development of general symptoms of intoxication.

The technique of novocain blockade has been described many times. Its essence is the injection of 50-80 ml. of 0.25 per cent novocain solution into both perirenal spaces. The injection is effected by means of a 10 ml. syringe and a long needle through a puncture of the muscles of the lumbar region (see ill.).

We have elaborated and begun practical application of the following combined system of burn treatment. Directly after the patient has been hospitalised he is subjected to bilateral lumbar blockade involving the injection of 50-70 ml. of a 0.25 per cent novocain solution on both sides into each perirenal space. The burn surface is treated very sparingly by means of sprinkling or bathing. After the wound surface is syringed with physiological solution or 0.5 per cent novocain, the burn surface is gently dried. The skin around the burn is cleansed with alcohol or ether. Then by means of a pair of scissors or pincers all foreign matter and obviously soiled shreds of epidermis are removed from the surface of the burn, care being taken not to cause unnecessary trauma. Blisters are cut open and liquid let out. After that, the whole burn surface is covered with two layers of gauze soaked in a penicillin solution (100000 ∂ μ to 100 ml. of a 0.25 per cent solution of novocain), after which are applied three layers of gauze well soaked with Vishnevsky's ointment composed of the following: Olei cadini 2.0, Xeroformi 2.0, Anesthesini 0.5, Ol. ricini 100.0. The whole is covered with two layers of dry gauze, a thin layer of cotton wool or lygnine. The whole surface is fixed in place with a bandage of gauze.

It must be noted that we have completely abandoned the so-called primary, mechanical treatment of the burn. This eliminated additional trauma to the nervous system which always aggravates the symptoms of shock. Besides that, by preserving all the loosened epidermis on the burn surface, we create a biological medium isolating the affected skin tissues from external irritation, particularly that caused by the bandage. We have never observed suppuration beneath the loose epidermis.

In burns of the second degree the bandage is not removed until complete healing, i. e. for 8-10 days. In the case of burns of the third degree, 8-10 days after the accident the patient is prescribed a general bath and change of bandages. The next change of bandages (also accompanied by bathing) is conducted after 5-7 days. During this period, sometimes even a little earlier, the necrotic tissue begins to fall off, which process we accelerate by a repeated bilateral lumbar blockade.

Acknowledging the great significance of such accepted means of opposing shock as blood, plasma and serum transfusion (of the same group or non-specific), we nevertheless regard them only as primary methods of symptomatic, or compensating treatment.

Our observations on the application of novocain in severe forms of burns have shown that this mode of treatment, if begun immediately (within an hour or an hour and a half) after thermal trauma, totally changes the whole course of the burn disease both in regard to primary shock and the development of plasmorrhea, blood clotting and autointoxication.

In case when local conditions (spinal burn) render lumbar blockade impossible, we resort to intravenous injection of 0.25 per cent novo-

cain solution (50-70 ml) This also produces a beneficial effect but less than in the case of lumbar blockade

During the last six years 520 patients with burns have applied for treatment to the A V Vishnevsky Surgery Institute (Vilavin and Shumova) Thermal burns were observed in 486 patients chemical burns in 34 Fatal outcomes occurred in 15 cases (2 9 per cent mortality) Out of the 43 patients with burn areas of 30-00 per cent only 13 died

A great advantage of our method of treating burns is the fact that mortality in the shock stages is reduced to negligible figures We have managed to relieve the patients of shock and toxemia in cases of extremely widespread lesions

The results of peripheral blood tests taken from our patients have somewhat differed from the data of other authors The increase in the hemoglobin amount and of erythrocytes in the blood according to our observations did not reach such large figures as those cited by authors who treated burns by other methods In our patients maximum blood concentration was marked on the third day The number of erythrocytes in 1 cmm of blood in grave cases at this stage did not usually exceed 0,000 000 while the quantity of hemoglobin was 100 per cent. Control observations conducted on patients with widespread burns of up to 55 per cent of total skin surface in cases when novocain blockade was not applied gave high figures of blood concentration—up to 124 per cent of hemoglobin and 7,000 000 erythrocytes

Analyses of the data of biochemical studies shows a fall to 20 per cent normal in the chlorides of the blood and urine of patients with extensive burns. The residual blood nitrogen rarely exceeded the upper limits of normal blood sugar did not show alterations in tests taken before meals from the 2nd till the 10th day of disease. As regards the clinical course of burns treated by our method we noted the absence or reduction of pain shortening of the febrile period, faster restoration of sleep and appetite as compared with the data of other authors.

64 patients were subjected to skin grafting by means of a dermatome In the majority of cases the grafts healed 100 per cent, and only in a small number of cases they took only partially

Thus the system of burn treatment that we have developed on the basis of novocain nerve blockade has given by objective estimates, better results than those previously obtained by means of other widely applied methods

We shall now pass to medicamental sleep as a means of curing burn disease

At the Surgery Institute medicamental sleep was applied altogether in 50 cases, the majority of which were burns of the second and third degree with an affected area of from 7 to 60 per cent.

In this system of management the treatment of the burned surface and the methods of bandaging are the same as in the cases of application of novocain blockade.

After being bandaged the patients are transferred for sleep therapy into a special ward isolated from all noise and having darkened windows Sleep is induced by peroral administration of 0 1-0.2 gm barbamil 4-5 times in 24 hours The duration of sleep is 5-6 days, with intervals in the morning at midday and in the evening for meals and toilet

During the intervals of awakening the patients receive food rich in proteins and vitamins In cases of extensive burns, at periods of increased temperature we prescribe intramuscular penicillin (during the periods of awakening)

One of the major manifestations of the therapeutic effect of both medicamental sleep and novocain blockade was the normalization of capillary permeability previously increased due to burn trauma which effect is not observed in any of the types of compensatory therapy We did not observe plasmorrhea in the patients their bandages constantly remained dry there was no blood condensation and hypoproteinemia which are common in severe burns Even when the burn surface exceeded 40 per cent and reached 60 per cent, the quantity of blood hemoglobin did not exceed 100 per cent and hematocrit readings showed the erythrocyte level to be no more than 60 per cent.

In conclusion we should like to make the following statement Considering the nervous genesis of burn disease we must regard novocain blockade of the nerves and medicamental sleep as methods of pathogenic therapy as they affect the mechanism of the origin and development, i e the pathogenesis of burn disease through the medium of the nervous system.

Acknowledging the similar therapeutic effect of both these methods, we nevertheless should like to stress that, as regards practical application, novocain blockade merits preference owing to its accessibility and simplicity of execution

Conclusions

1 In a combined system of burn disease treatment a large rôle should be assigned to our measures of protecting the nervous system, both preventive—sparing treatment of burn affected tissues and oil-balsam bandage, and therapeutic—such as novocain nerve blockade or medicamental sleep

2 The system of burn treatment which we employ combines methods of influencing the nervous system with measures of compensatory therapy (transfusion of blood, plasma, etc) and prevents thereby the development of severe derangements of hemodynamics, loss of blood plasma and blood protein

Novoslobodskaia 57/65, Moscow, U S S R

Le Rôle du Système Nerveux dans le Développement de la Maladie des Brûlés et Notre Methode de Traitement. Alexander A Vishnevsky

Tenant compte de l'origine nerveuse de la maladie des brûlés il est nécessaire de considérer le blocage nerveux par la novocaïne et le sommeil médicamenteux comme des methodes de thérapeutique pathogénique puisqu'elles influencent le mécanisme déclenchant c'est-à-dire la pathogénie de la maladie des brûlés à travers le système nerveux

Bien que appréciant à sa juste valeur l'effet thérapeutique de ces deux méthodes, l'auteur tient néanmoins à insister du point de vue pratique sur les merites du blocage novocainique à cause de sa facilité et de la simplicité de son exécution

Conclusions

1 Dans un système combiné du traitement des brûlures, une grande place doit être faite aux mesures de protection du système nerveux tant du point de vue préventif (traitement d'épargne des tissus brûlés et bandage au baume) que thérapeutique (blocage novocainique des nerfs et sommeil médicamenteux)

2 Le système du traitment des brûlures utilisé par l'auteur combine les méthodes d'action sur le système nerveux et des mesures de thérapeutique compensatrice (transfusion de sang, de plasma, etc) et empêche donc l'installation de troubles graves de l'hémodynamique et la perte du plasma et des protéines du sang

Die Rolle des Nervensystems bei der Entwicklung von Verbrennungskrankheiten und unsere Behandlungsmethoden. Alexander A Vishnevsky

Bei der Betrachtung der nervalen Genese der Verbrennungskrankheit mussen wir die Novocainblockade der Nerven und den medikamentosen Schlaf als eine Methode der kausalen Therapie ansehen, da sie den Entstehungsmechanismus und die Entwicklung, d h die Pathogenese, der Verbrennungskrankheit auf dem wege uber das Nervensystem beeinflussen

Indem wir den ahnlichen Therapieeffekt dieser beiden Methoden anerkennen mochten wir dennoch betonen, daß hinsichtlich der praktischen Ausfuhrbarkeit die Novocainblockade wegen ihrer Zuganglichkeit und Einfachheit in der Ausfuhrung den Vorzug verdient

Schlußfolgerung

1 In einem kombinierten Behandlungssystem der Verbrennungskrankheit sollte auf unsere Maßnahmen zum Schutz des Nervensystems, sowohl auf die vorbeugende—wobei die Behandlung der brandbefallenen Gewebe und Ölsalbenverbande gespart werden als auch auf die therapeutischen Maßnahmen wie Novocainnervenblockade und medikamentoser Schlaf großes Gewicht gelegt werden

2 Das Behandlungssystem der Verbrennungen, das wir anwenden, vereinigt Methoden der Beeinflussung des Nervensystems mit Maßnehmen einer kompensatorischen Therapie (Blut- und Plasmatransfusion etc) und verhindert hiermit die Entwicklung von schwerer Schadigung der Haemodynamik, Blutplasma- und Blutproteinverlust

El Papel del Sistema Nervioso en el Desarrollo de la "Enfemedad de Quemaduras" y Nuestro Metodo de Tratarla. Alexander A Vishnevsky

De acuerdo con la génesis nerviosa de la "enfermedad de quemaduras," el bloqueo nervioso de los nervios y el sueño medicamentoso deben considerarse como métodos de terapia patogénica ya que afectan el mecanismo y el desarrollo de la patogénisis del padecimiento por medio del sistema nervioso

De acuerdo con ésto, el bloqueo de novocaina debe ser considerado seriamente

Conclusiones

1o En un sistema combinado de tratamiento debe asignarse medidas protectoras para el sistema—nervioso y locales

2o El sistema de quemaduras que empleados combina medios de influencias el sistema nervioso con medidas de terapia compensadora (transfusión de sangre, plasma), previniendo el desarrollo severo de perturbaciones hemodinámicas

B Radiation and Phosphorus Burns

Experiences of Atomic Bomb Burns in Japan.*

ISAHARU MIKI Professor Medical Department, University of Tokyo, 1 Motofuji cho Bunkyo-ku, Tokyo Japan

The Japanese people have experienced atomic bomb injuries not only at Hiroshima and Nagasaki in 1945 but more recently in 1954 on board the fishing boat "Fukuryu-maru"

Many doctors took part in the treatment of these injuries and many papers on their experiences were published. I will report on some of this especially the burns by fission products on board the fishing boat

Characteristic of the burn scars resulting from the atomic bomb explosions of 1945 were true keloids and hypertrophic scar formation The pathogenesis of this disturbance of scar formation we think was not only due to failure of the first treatment or malnutrition of the patients but also due to radiating energy

The more recent injuries were caused by the ashes on March 1 1954. Twenty three fishermen of "Fukuryu-maru" were showered by the ashes in the Pacific ocean 80 miles distant from the explosion. They were working with shirts and trousers on and all but a few wore hats Ash shower lasted for 5 hours

On their return to Yaizu harbour on March 14 skin blisters erosions and necrosis and falling out of hair were found on the extremities and the head.

One of the injured fishermen visited The Tokyo University Hospital and was diagnosed as radiation injury by Professor Dr K. Shimizu Immediately all the fishermen were admitted to Tokyo University Hospital and the First National Hospital According to Dr K I hikawa their skin injuries were as shown in Table I

All men on board had injuries 2 men without hats suffered skin necrosis on the top of the head The skin demarcated and fell off in one month or by the end of March Ulcers remained but were replaced by scar by the end of two month (Fig 16) Less severe were the erosions on the scars Also less severe were blisters on the extremities where the clothes



FIG 16

were tied with string and fission products remained for several days The slight damage of the skin was erythema with edema

The skin on which blisters had formed healed with pigmentation or depigmentation The falling off of the hair that occurred in all cases continued for 2 months until the end of April Small white hairs began to grow during May (the third month) and now all have normal hair growth

The skin showing erythema was examined microscopically There was vascular dilatation in the epidermis increase in pigment and cell infiltration This is the typical picture of radiation dermatitis

What were the ashes that showered on the boat?

Professor K Kimura analyzed them qualitatively and quantitatively The results are shown in Tables 2 and 3

The ashes were also autographed by Professor Dr S Nakaizumi. Beta rays and Gamma rays were demonstrated in the autogram (Fig 17) The hair of the head on which necrosis occurred showed marked radioactivity having 2000 counts per minute per 0 1 gm and Fig. 18 shows their radioautograms The fishermen were not only radiated by the ash shower but they lived on a radioactive ship for two weeks and ate radiated potatoes It is not clear how much radioactive energy they received but it is evident that the skin changes are due to Beta ray irradiation.

* Read by Donald Sargeant M D at the Congress

TABLE 2

Qualitative Analysis of the Ash (March 1954)

Element	Nuclide	Half life
Strontium	Sr-89	53d
Yttrium	Y-91	61d
Zirconium	Zr-95	65d
Niobium	Nb-95m	90h
Niobium	Nb-95	35d
Ruthenium	Ru-103	39.8d
Ruthenium	Ru-106	1.0y
Rhodium	Rh-106	30.s
Antimony	Sb-127	93h
Tellurium	Te-132	77.7h
Iodine	I-131	8.141d
Iodine	I-132	2.4h
Barium	Ba-140	12.8h
Lanthanum	La-140	40.0h
Cerium	Ce-144 or Ce-141 or both	28.2d 33.1d
Strontium	Sr-90	19.9y
Yttrium	Y-90	61h

TABLE 3

Quantitative Analysis of the Ash

rare earth elements	5%
Ba-140	5%
La-140	5%
Sr-89	0.8%
Sr-90	0.02%
Y-90	0.02%

Treatment of patients injured by radioactive energy is directed first of all to an improvement of their general condition. This is accomplished by rest nourishment blood transfusions etc The next step is local treatment of the burns. We have no special effective measures in atomic burns.

Dr K. Ishikawa performed some experiments to remove radioactive elements The material tested was 0 1 gm hair which had radioactivity of about 16000 counts per minute The material was soaked in different solutions acetic acid, sodium carbonate etc After 10 minutes the radioactivity of the solutions was checked by Geiger counter and the density of autoradiogram of the material before and after was compared. Results are shown in Table 4. Weak acid solutions and weak alkali solutions were the most effective used. After these experiments a mixture of 4 Na-EATA and 2 Na EDTA (4 1) was used The pH of the mixture is 9.3 and solutions of 1/250 and 1/140 concentration were used. his solut[illegible] be more effective

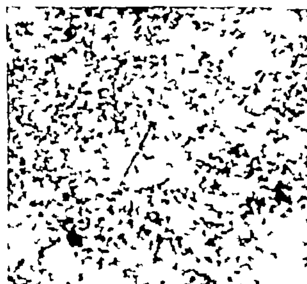


FIG. 17

than 6 per cent acetic acid or weak alkali solution. However the most simple method to remove radioactive material was the early mechanical one

We lost one of our patients. The effect of radioactive energy upon the human body is very severe and I hope these weapons will never be used again.

Experience Acquise sur les Brûlures por Bombes Atomiques au Japon. ISAHARU MIKI

Les Japonais ont du faire à deux reprises l'expérience des traumatismes causés par la bombe atomique à Hiroshima et Nagasaki en 1945 et à bord du bateau de pêche "Fukuryumaru en 1954. Ce qui caractérisait les traumatismes cutanés provoqués par l'explosion de la bombe atomique de 1945 était la tendance à l'hypertrophie et la



FIG. 18

TABLE 1

Solution	Decrease of radioactivity	Decrease in integrum
6% acetic acid	5070 count/m	±
5% Na Carbonate	5150	++
10% ammonium water	6650	±
01% KMnO4	1950	—
02% EDTA-2Na	1230	±
Saturated EDTA-2Na	590	—
Alcohol	150	—
Ether	190	—
Alcohol and Ether	140	—
Kao-shampoo	2145	—

formation d'énormes chéloides sur les cicatrices de brûlure

Dans le second cas, les brûlures avaient été causées par les cendres produites par les explosions de bombe atomique sur l'île de Bikini En mars 1954, 23 pêcheurs furent aspergés par les produits de fission en pleine Océan Pacifique à 80 miles de l'explosion A leur retour à la baie de Yaizu, le 14 mars, ils étaient porteurs d'ampoules, d'érosions et de necrose de la peau et on a noté la perte de cheveux et des poils sur les parties à nu de leur membre et de leur tête

Quand on traite de telles brûlures on doit en premier lieu essayer d'améliorer l'état général des malades sans pour cela recourir à des mesures locales particulières

Erfahrungen uber Verbrennungen infolge Atombomben in Japan. ISAHARU MIKI

Wir Japaner haben die Verletzungen durch Atombomben zweimal erlebt—1945 in Hiroshima und Nagasaki und 1954 an Bord des Fischerbootes "Fukuryumaru" Es war charakteristisch fur die durch die Atomexplosion 1945 erzeugten Hautverletzungen, dass die Verbrennungsnarben Neigung zeigten, hypertrophisch zu werden und massive Keloide zu bilden

Zweitens wurden Verbrennungen erzeugt durch die Asche, die bei der Atombombenexplosion auf der Bikini-Insel entstand Im Marz 1954 wurden 23 Fischer 80 Meilen entfernt vom Explosionsort im Stillen Ozean von den Spaltprodukten uberschuttet Als sie am 14 Marz in den Hafen von Yaizu zuruckkehrten, wurden Blasen, Erosionen, Nekrosen der Haut und Haarverlust an den exponierten Teilen ihrer Gliedmassen und Kopf festgestellt

Bei der Behandlung dieser Verbrennungen mussten wir in erster Linie versuchen, den Allgemeinzustand der Patienten zu verbessern Wir haben keine speziellen Methoden fur die Lokalbehandlung

Experiencia de las Quemaduras de Bomba Atomica en el Japon. ISAHARU MIKI

Nosotros los japoneses tenemos doble experiencia en heridas de bomba atómica—en Hiroshima y Nagasaki en 1945, y a bordo del "Fukuryumaru," bote pesquero, en 1954 Era característico de las heridas de piel causadas por la bomba atómica en 1945, que las cicatrices por quemaduras tenían la tendencia a hacerse hipertroficas y con formación de tejido queloide masivo

Secundariamente, las quemaduras causadas por las cenizas producidas por la explosión de la bomba atómica en las islas Bikini En marzo de 1954, 23 pescadores fueron "rociados" en el Oceano Pacífico, a 80 millas de la explosión Cuando regresaron al puerto de Yaizu, en Marzo 14, se encontraron en sus extremidades, cabezas y partes expuestas, vejigas, erosiones, necrosis de la piel y pérdida del cabello

Para tratar éstas quemaduras, tuvimos primero que mejorar la condición general de los pacientes, y no se tomaron medidas especiales para su tratamiento local.

A Plan in the Management of Radiation Disease of the Facial Skin. ROBERT G LANGSTON, M D, F A C S, 925 West Georgia Street, *Vancouver, B C, Canada*

The management of radiation atrophy and necrosis of the skin has proved, over the years, challenging to many surgeons who have seen and conducted any appreciable number of these cases When the condition is present in other than facial and hand areas, the problem is simply one of complete removal of the affected skin Replacement by an appropriate type of skin graft does not usually present any serious difficulty In the treatment of hand lesions, there may be some complication in maintaining hand function, but complete removal and repair can be done In facial lesions, the radiation damage often is extensive and, because of the site, complete removal and repair impose serious problems Because of the unsatisfactory result of skin replacement, there is a great temptation for both patient and surgeon to temporize in complete removal This can only lead to eventual disaster I would like to discuss, in this paper, a method of surmounting these difficulties which has been in use now for three years

In briefly reviewing the march of events that produce the radiation damage to the skin, the question of incidence is of interest Radiation necrosis of the skin, or radio-dermatitis, is a pathological entity that is assuming more and more importance to the human animal as civilization advances Except for the instances of

TABLE 2

Qualitative Analysis of the Ash (March 1954)

Element	Nuclide	Half life
Strontium	Sr–89	53d
Yttrium	Y–91	61d
Zirconium	Zr–95	65d
Niobium	Nb–95m	90h
Niobium	Nb–95	35d
Ruthenium	Ru–103	39.8d
Ruthenium	Ru–106	1.0y
Rhodium	Rh–106	30.s
Antimony	Sb–127	93h
Tellurium	Te–132	77.7h
Iodine	I–131	8.141d
Iodine	I–132	2.4h
Barium	Ba–140	12.8h
Lanthanum	La–140	40.0h
Cerium	Ce–144 or Ce–141 or both	28.2d 33.1d
Strontium	Sr–90	19.9y
Yttrium	Y–90	61h

TABLE 3

Quantitative Analysis of the Ash

rare earth elements	5%
Ba–140	5%
La–140	5%
Sr–89	0.8%
Sr–90	0.02%
Y–90	0.02%

Treatment of patients injured by radioactive energy is directed first of all to an improvement of their general condition. This is accomplished by rest nourishment blood transfusions etc. The next step is local treatment of the burns. We have no special effective measures in atomic burns.

Dr K. Ishikawa performed some experiments to remove radioactive elements. The material tested was 0 1 gm hair which had radioactivity of about 10000 counts per minute The material was soaked in different solutions acetic acid, sodium carbonate etc After 10 minutes the radioactivity of the solutions was checked by Geiger counter and the density of autoradiogram of the material before and after was compared. Results are shown in Table 4 Weak acid solutions and weak alkali solutions were the most effective used. After these experiments a mixture of 4 Na EATA and 2 Na EDTA (4 1) was used. The pH of the mixture is 9.3 and solutions of 1/250 and 1/140 concentration were used. his solution proved to be more effective

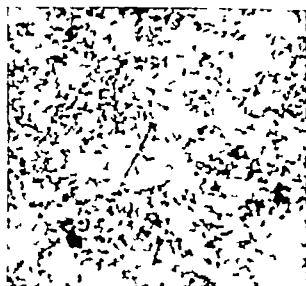


FIG. 17

than 6 per cent acetic acid or weak alkali solution. However the most simple method to remove radioactive material was the early mechanical one

We lost one of our patients The effect of radioactive energy upon the human body is very severe and I hope these weapons will never be used again.

Experience Acquise sur les Brûlures par Bombes Atomiques au Japon. ISAHARU MIKI.

Les Japonais ont du faire à deux reprises l'expérience des traumatismes causés par la bombe atomique à Hiroshima et Nagasaki en 1945 et à bord du bateau de pêche Fukuryumaru" en 1954. Ce qui caractérisait les traumatismes cutanés provoqués par l'explosion de la bombe atomique de 1945 était la tendance à l'hypertrophie et la



FIG. 18

TABLE 1

Solution	Decrease of radioactivity	Decrease in integram
6% acetic acid	3070 count/m	±
5% Na Carbonate	3150	++
10% ammonium water	6650	±
01% KMnO4	1950	—
02% EDTA-2Na	1230	±
Saturated EDTA-2Na	590	—
Alcohol	150	—
Ether	190	—
Alcohol and Ether	140	—
Kao-shampoo	2145	—

formation d'énormes chéloïdes sur les cicatrices de brûlure

Dans le second cas, les brûlures avaient été causées par les cendres produites par les explosions de bombe atomique sur l'île de Bikini En mars 1954, 23 pêcheurs furent aspergés par les produits de fission en pleine Océan Pacifique à 80 miles de l'explosion A leur retour à la baie de Yaizu, le 14 mars, ils étaient porteurs d'ampoules, d'érosions et de necrose de la peau et on a noté la perte de cheveux et des poils sur les parties à nu de leur membre et de leur tête

Quand on traite de telles brûlures on doit en premier lieu essayer d'améliorer l'état général des malades sans pour cela recourir à des mesures locales particulières

Erfahrungen uber Verbrennungen infolge Atombomben in Japan. ISAHARU MIKI

Wir Japaner haben die Verletzungen durch Atombomben zweimal erlebt—1945 in Hiroshima und Nagasaki und 1954 an Bord des Fischerbootes "Fukuryumaru" Es war charakteristisch fur die durch die Atomexplosion 1945 erzeugten Hautverletzungen, dass die Verbrennungsnarben Neigung zeigten, hypertrophisch zu werden und massive Keloide zu bilden

Zweitens wurden Verbrennungen erzeugt durch die Asche, die bei der Atombombenexplosion auf der Bikini-Insel entstand Im Marz 1954 wurden 23 Fischer 80 Meilen entfernt vom Explosionsort im Stillen Ozean von den Spaltprodukten uberschuttet Als sie am 14 Marz in den Hafen von Yaizu zuruckkehrten, wurden Blasen, Erosionen, Nekrosen der Haut und Haarverlust an den exponierten Teilen ihrer Gliedmassen und Kopf festgestellt

Bei der Behandlung dieser Verbrennungen mussten wir in erster Linie versuchen, den Allgemeinzustand der Patienten zu verbessern Wir haben keine speziellen Methoden fur die Lokalbehandlung

Experiencia de las Quemaduras de Bomba Atomica en el Japon. ISAHARU MIKI

Nosotros los japoneses tenemos doble experiencia en heridas de bomba atómica—en Hiroshima y Nagasaki en 1945, y a bordo del "Fukuryumaru," bote pesquero, en 1954 Era característico de las heridas de piel causadas por la bomba atómica en 1945, que las cicatrices por quemaduras tenían la tendencia a hacerse hipertróficas y con formación de tejido queloide masivo

Secundariamente, las quemaduras causadas por las cenizas producidas por la explosión de la bomba atómica en las islas Bikini En marzo de 1954, 23 pescadores fueron "rociados" en el Oceano Pacífico, a 80 millas de la explosión Cuando regresaron al puerto de Yaizu, en Marzo 14, se encontraron en sus extremidades, cabezas y partes expuestas, vejigas, erosiones, necrosis de la piel y perdida del cabello

Para tratar éstas quemaduras, tuvimos primero que mejorar la condición general de los pacientes, y no se tomaron medidas especiales para su tratamiento local

---

A Plan in the Management of Radiation Disease of the Facial Skin. ROBERT G LANGSTON, M. D, F A C S, 925 West Georgia Street, *Vancouver, B C, Canada*

The management of radiation atrophy and necrosis of the skin has proved, over the years, challenging to many surgeons who have seen and conducted any appreciable number of these cases When the condition is present in other than facial and hand areas, the problem is simply one of complete removal of the affected skin Replacement by an appropriate type of skin graft does not usually present any serious difficulty In the treatment of hand lesions, there may be some complication in maintaining hand function, but complete removal and repair can be done In facial lesions, the radiation damage often is extensive and, because of the site, complete removal and repair impose serious problems Because of the unsatisfactory result of skin replacement, there is a great temptation for both patient and surgeon to temporize in complete removal This can only lead to eventual disaster I would like to discuss, in this paper, a method of surmounting these difficulties which has been in use now for three years

In briefly reviewing the march of events that produce the radiation damage to the skin, the question of incidence is of interest Radiation necrosis of the skin, or radio-dermatitis, is a pathological entity that is assuming more and more importance to the human animal as civilization advances Except for the instances of

continued exposure to intensive sunlight in susceptible individuals the condition was first reported in 1890[1] There is an ever increasing use of highly potent radioactive substance—radium, X ray cobalt bombs in therapy radioactive isotopes and the ever present possibility of damage from the atom bomb It is reasonable to expect a greatly increased incidence of radio-atrophy and eventually radionecrosis of the skin. And this in spite of the deep concern the radiotherapists and scientists are showing to its dangers.

In 1925 Dr John Staige Davis[2] said, "It would be rational to expect that with the advances made in the proper dosage of Röntgen rays burns from this source would become less and less frequent As a matter of fact this does not seem to be the case In my own practice, I am seeing these burns more frequently than five years ago when I presented a paper on radical treatment of Röntgen ray burns before the American Surgical Association. If Dr Davis were alive now he would be justified in viewing with alarm the many times greater incidence of this condition as compared to his statement thirty years ago

In the past ten years I have been seeing a steadily increasing number of cases each year Many of them it is true, should not have been exposed to the radiation as treatment of the initial lesion I do not think that any competent radiologist would quarrel with me when I suggest that benign lesions—such as hirsutism, eczema acne psoriasis lupus erythematosis plantar warts lymphangioma haemangioma—could and should be treated by other means than radiation.

Porter[3] has divided radiation dermatitis into three main groups

(i) Lesions that are the result of single massive doses or a few exposures at short intervals intentionally given for a malignant condition Burns from this group are few but may occur In this type of case a calculated risk is being taken to control an otherwise lethal condition When the malignancy is controlled, means can be taken to control the effects of the burn In this group one would like to urge upon the radiotherapist to acknowledge the fact that radionecrosis will eventually ensue and that he owes it to the patient to see that surgical removal of the affected skin is done as a final step of his treatment.

(ii) Patients receiving exposures over a long period of time as treatment for benign conditions such as mentioned above, and including naevi and keloid Extreme caution on the part of the radiotherapist is indicated. There is a strong temptation to renew the treatment, should the condition recur minimizing the latent effect of the previous radiation. Also the patient may have been "shopping around and, unknowingly subjected himself to over treatment. A very careful history by both the referring physician and the radiotherapist should prevent this

(iii) Radiation necrosis in professional personnel Happily with better understanding, one is seeing fewer physicians—and particularly dentists—who have burned themselves whilst using X rays

Pathological sections of skin that is damaged by radiation show hypertrophy of the epithelium atrophy of the cells of the corium with loss of the (1) sebaceous glands (2) hair follicles and (3) sweat glands There is a marked obliterative endarteritis affecting all vessels and seriously reducing the blood supply to the skin. Lymph space is seriously reduced. This process is limited to the skin layer although the deeper connective tissue may show strands of fibrin pointing to a reparative process occurring as a result of deeper damage than the skin.

When the X ray destruction penetrates deeper the most important change shows in bone the blood supply of which is easily damaged. As a result it succumbs to the slightest infection and becomes necrotic. The dividing line between live and dead bone is not well defined and, *although sequestration takes place* it is very slow in separation Daland[4] reported a case of exposed bone remaining in place for five years. A further complication with necrosis of bone is the pain. It is an outstanding feature. There are few other conditions that can equal the intensity and duration of the pain.

Following the atrophy the skin contracts becomes dry and develops small fissures. Eventually malignant changes follow with squamous cell infiltration predominating Because of the endarteritis with reduced lymphatic and blood circulation metatasis is very slow and late. Spread of the malignancy is by extension of the lesion as long as it remains in the skin. Spread

is more likely to be that of a multifocal lesion—new foci developing in other areas of damaged skin It is this fact that makes complete removal of all affected skin a practical means of preventing further spread of the disease, and giving the patient an excellent chance of ridding him of his cancer

It is these two points that one wishes to stress—the fact that metatasis is late and slow and, secondly, that complete removal of the affected skin gives a high percentage of complete cures They are important in the conduct of any case of radiation atrophy or necrosis of the skin When first seen, the skin may only be dry with some fine, irregular discoloration There is no evidence of hair follicles and the sebaceous and sweat gland activity is completely lost The patient will complain of the dryness and probably slight irritation The skin feels something like rough parchment In the early stages there is no fissuring or ulceration The process is slow and it may be years before actual breakdown and ulceration occur But eventually, a small indolent ulcer will develop or there may be several small areas separated from each other These ulcerations rapidly develop malignant changes, if these changes have not already taken place It can be seen that the entire area is potentially malignant

Treatment should be surgical For years some radiotherapists have used a radon paste to stimulate healing of deep ulcers caused by radiation It is evidently a material that carries some of the less active and penetrating ions of radiation It may be of use to stimulate an increased blood supply in a tissue that is capable of such a response But, in the skin that has been atrophied by radiation, the inflammatory response is impossible Thus this paste is not of the slightest use On the other hand, surgical excision will remove the incipient squamous cell cancer Adequate removal of the area should cure the patient of his malignancy But let us clearly understand what adequate removal means It does not mean wide removal if, in doing so, any skin that shows the effect of radiation is left As has been mentioned, this damaged skin, if given time, will break down Should it not be entirely removed, the surgeon has not done his best for the patient He can expect that, sooner or later, further removal will be needed followed by the necessary repair And during this interval, the patient will be living with the fear that he may have further cancer at any time

The face is the part of the body that most often receives radiation therapy Often both the doctor and the patient will look for means to treat benign blemishes of the face with methods other than surgery, in the hope that scarring can be prevented Such conditions are hirsutism, acne, eczematous dermatitis, lupus erythematosis, naevi and keloid Also, it may be necessary in treatment of carcinoma of parotid or tonsil As a result, a large amount of the skin of the face may show effects of radiation This applies particularly to that of the lower face and neck Thus, there is an indication for removal of a great deal of skin of the face One must meet two particular problems in planning such a removal One, is to convince the patient that such radical surgery is necessary The second is the technical problem of re-covering the face satisfactorily after the removal If the second problem can be solved, the first becomes easier to surmount It is much easier to convince the patient of the importance of such a radical removal, if one can assure him that a satisfactory replacement can be done

The total or nearly total re-covering of the face with skin has intrigued plastic surgeons for a long time This was particularly so during the war years, when burns and gunshot wounds were common occurrences During the war, Sir Harold Gillies planned and executed a massive flap from the chest for covering the face of a burned airman Dr Gonzales-Ulloa [5] published an article on such a complete pedicle replacement from the shoulder and back All of these have been a covering with pedicle skin They have one definite disadvantage, aside from the time, the work of nursing care, and danger of complication during the period of healing That is the loss of facial expression when all is finished The facial muscles are unable to attach themselves to the new skin, and the patient remains with a mask-like expression

The use of split skin to the face has always been considered to give a poor cosmetic result This is particularly so when part of the face is re-covered The grafted skin never matches the residual skin and the result is a patchy appearance If total, or at least bilaterally equal parts of the face are grafted, this patchy appear-

ance can be greatly eliminated. Another reason that facial grafting is avoided is the tendency to lose some of the grafted area from haematoma or infection The haematoma problem can be controlled by the practice of delaying the grafting for forty-eight hours after preparation of the recipient site And, with the use of the wide spectrum of antibiotics infection can usually be kept under control Finally there is the objection of secondary contracture when split skin is applied to the face One has some control of this when thick split skin is used. This can be almost full thickness skin cutting it so that some fat shows between the bases of the follicles in the donor site Another factor is the cutting of large sheets of skin as can be done by some of the automatic devices. Use of these large sheets of skin eliminates the scars which result from joining pieces of skin when applying the graft The cutting of a sufficiently large sheet of skin is now easily done by the use of the Giant Dermatome.*

I am showing slides of two cases that have been treated by thick split skin grafts The first case was done three years ago She had an extensive squamous cell carcinoma of the left cheek and nose This was the result of X radiation given to treat lupus erythematosis fifteen years previously (Fig 10) At the operation, the nose was completely removed and about half of the thickness of the left cheek. All of the rest of the skin was removed down to below the mandibular border The forehead was included but the eyelids were left Following the removal and haemostasis, vaseline mesh and pressure dressing were applied. This was left in place for forty-eight hours at which time she was grafted with three 4" (10 cms) strips of skin removed from her inner thigh.

Recovery was uneventful There was no loss of graft and she was discharged from hospital within two weeks (Fig 20) The graft went through the usual period of contracture followed by softening and stretching in six months At that time an artificial nose was made At the present time as one can see the grafts are smooth and there is a minimal amount of disfigurement There is no contracture, even at the lines of joining the grafts She has good facial expression and smiles and frowns easily (Figs. 21 and 22) Three years have elapsed since the replacement and there is no evidence of recurrence of the malignancy She meets the public without strain although before operation she had good reason—as you can see—to keep her face covered Unless one scrutinized her rather closely one would not suspect a total facial skin replacement

The second case is one of radiation atrophy of the lower face and neck, following non-professional treatment for hirsutism. There was an area of early squamous cell infiltration on the tip of the nose A similar operation was done, delaying the graft for forty-eight hours. In this case the neck was covered but the forehead not replaced It is now nine months since the operation and the slides show the graft not fully recovered from the period of contracture The softening and stretching stage is progressing normally although somewhat slower than the average with these grafts. The patient is pleased with the result particularly to know that all of the skin which may develop cancer has been removed. She appears in public easier than before removal of the atrophic skin.

To recapitulate I would like to present for consideration this method of management of radiation atrophy of the facial skin One believes that all such skin is very prone to break down and become malignant if given time. To remove this cancer threat and give the patient *peace of mind it is reasonable to advocate* complete removal before or at least immediately as soon as cancer cells can be demonstrated One would like also to stress the importance of massive removal rather than partial removal. Such a programme is safer and also gives a better cosmetic result. Finally a feasible method of skin replacement is suggested which does not incapacitate the patient too long, nor requires extra time and nursing care.

In conclusion, I would like to make a special plea to those who see the bigger number of cases —the radiotherapist or cancer clinic consultant Atrophy of the skin must occasionally follow the treatment of cancer by radiation Recognising this and referring the patient for removal of this damaged skin, should be the final step in the successful cure of cancer in these cases.

References

1 Teloh Mason and Wheelock Histopathologic study of radiation injuries of the skin. S G O



FIG 19 (upper left) Pt with localised area of squamous cell carcinoma of the cheek and nose, the long term result of radiation for the treatment of lupus erythematosis

FIG 20 (upper right) The same patient six weeks after radical excision of the skin of her face and replacement with split skin grafting

FIG 21 (lower left) The same patient two years after operation

FIG 22 (lower right) The same patient with prosthesis but no make-up

90 335-348 1950 Twenty-eight per cent incidence of carcinoma following radiation
2. Davis J S Treatment of deep roentgen ray burns by excision and tissue shifting. J.A.M.A., 86 1132, 1026
3 Porter C A Surgical treatment of roentgen ray lesions Am. J Roentgenology 13 31-37 1925
4 Daland E. M Surgical treatment of post irradiation necrosis Am J Roentgenology 46 87-301 1941
5 Gonzalez-Ulloa M Total restoration of the facial skin Plastic & Reconst Surg., 13 151 161 1954
6. Litton Clyde "A New Giant Dermatome" Plastic & Reconst Surg 13 240-215 1054

Un Plan pour le Traitement du Mal des Rayons au Niveau de la Peau de la Face ROBERT G LANGSTON

L auteur a eu a soigner un grand nombre de cas de cancers spino-cellulaires consécutifs à des irradiations X d'hypertrichose de la face qui n avaient pas été soumis a une surveillance médicale Ces cas étaient remarquables par leur tendance plurifocale de transformation maligne pendant une periode couvrant de nombreuses années. Il en est résulte que toute finalité dans le traitement s est revelée presque impossible et quo l on a abouti aux séquelles inévitables d atteinte des structures profondes d ou importante defiguration après chirurgie radicale Pour pallier à cette incertitude tant dans le traitement que dans le pronostic, l'auteur a pratiqué dans 2 cas l exérese totale de la peau irradiée qu il a remplacée par des greffes dermo-épidermiques. Dans un cas il a fallu remplacer 80% de la peau de la face et dans l autre 75% de la peau de la face et la partie antérieure du cou. Le premier cas n a présenté aucun symptôme depuis trois ans L article donne la technique et les résultats de ce travail et le tout est complété par des cliches en couleur de 35 mm

Ein Behandlungsplan von Bestrahlungsschäden der Gesichtshaut. ROBERT G LANGSTON

Es kamen verschiedene Falle von Plattenepithel-Carcinomen des Gesichts in unsere Beobachtung die als Folge nicht medizinisch überwachter Röntgen-Bestrahlung wegen Hypertrichosis entstanden waren. Diese Fälle waren bemerkenswert wegen ihrer jahrelangen multifokalen Tendenz zur Bösartigkeit. Infolgedessen hat sich eine endgültige Behandlung wegen der unvermeidlichen Folgeerscheinungen an den tiefer liegenden Gewebestrukturen und wegen der groben Entstellungen, die einem radikalen chirurgischen Vorgehen folgen würden, als beinahe unmöglich erwiesen Um diese Ungewissheit in der Behandlung und der Prognose auszuschalten, wurde die völlige Entfernung der bestrahlten Haut in zwei Fällen ausgefuhrt Der Ersatz wurde durch Spalthautlappen vorgenommen. In einem Fall betraf dieses 80% der Gesichtshaut. In dem anderen wurden 75% der Haut des Gesichtes und des vorderen Halses ersetzt. Der erste Fall ist seit drei Jahren vollkommen symptomfrei. Operationstechnik und—ergebnisse werden in dem Referat an Hand von 35 mm Farb-Diapositiven wiedergegeben

Plan para el Manejo de las Radiodermitis Faciales. ROBERT G LANGSTON

Hemos tratado algunos casos de carcinoma celulo-escamoso de la cara consecutivos a la aplicación de rayos X sin supervisión médica para tratar hipertricosis Estos casos han sido notables *debido a su tendencia multifocal de cambios malig*nos en un período de varios años Como resultado la finalidad del tratamiento ha probado ser casi imposible con las inevitables secuelas de lesión de los tejidos profundos que originan grandes deformidades despues de la cirugía radical Para obviar esta incertidumbre en el tratamiento y en el pronostico se tuvo que efectuar la remoción completa de las áreas de piel irradiadas en dos casos La piel se reemplazó mediante injertos de medio espesor En uno de los casos, estaba comprendido el 80% de la piel de la cara En el otro el 75% de la piel de la cara y de la región anterior del cuerpo fue reemplazado El primer caso ha estado libre de síntomas durante tres años. La tecnica y los resultados se reportan en este trabajo ilustrándolo con diapositivas de 35 mm.

The Healing Effect of Skin Grafts on Tissues Damaged by Radiation

C F KOCH DR. *Amsterdam Holland*

There is only one way to heal radiation burns total excision followed by repair of the loss of tissue In severe cases total excision of the damaged area means extremely wide and deep extirpation of skin, fat muscles, fascia and bone.

There is a tendency to use by preference pedicled flaps in the repair of large tissue losses.

One of the reasons is the opinion that for free grafts the bottom of the area that has to be covered should be absolutely clean and well vascularised. However it happens not so seldom that the base of the wound consists of extensive areas of sclerotic tissue Specially in the neck removal of deep muscles conglomerated with the great vessel trunk adds great risks and difficulties to the already wide extirpation. This tissue shows opaque colored patches, feels hard like wood and shows only here and there a few red pinpoints where the poor distribution of small vessels is still visible As a rule and under other conditions we would never consider a base

like this appropriate for a free graft transplantation

Nevertheless we started to cover such areas with a temporary free graft and we were greatly surprised to find that a large percentage of the graft took Waiting for a few weeks till the small losses again could be treated by transplantation we were surprised once more that these raw areas had healed spontaneously

It certainly is worth while to try and avoid pedicled flaps because of their manifold operations and much longer hospitalisation

The unexpected case of take of free grafts in repair of radio burns may be explained by an improvement of the vascularisation in the tissues that had remained in place We know that a pedicled transplantation can improve the vascularisation of residual tissues damaged by radiation In that case the addition of the healthy and rich vessels of the implanted flap is a favorable element for the vitality of the damaged tissues that were left behind Marino calls it the "biologic excision"

In case of free transplantations an improvement also takes place in a quite different way We made a curious observation in connection to this problem Our pathologist Dr Hampe found in a case of development of carcinoma at the bottom of a radiation ulcer that below this ulcer next to the carcinoma a large number of open vessels were present (Fig 23) This is very unusual as the area under such an ulcer generally shows no open vessels or very few (Fig 24) Carcinoma needs a certain amount of "food" to grow and we can put the question is it possible that the cutis spontaneously provides sufficient vascularisation to make it possible for the carcinoma to grow or is it that the carcinoma by chemotaxis compels so to speak the inert tissue to produce granulation tissue?

The last supposition is in our opinion more acceptable The ulcer formation is caused by the disappearance of open vessels in the layer under the bottom of the future ulcer

So we can compare the influence of carcinoma on the development of vascularisation to the known fact that a free skin graft stimulates the development of granulation tissue and vessels in the adjoining neighbourhood The beautiful experiments of Conway e a [1] with the tissue chamber have proved this without any doubt Recently also Dufourmentel and M Pierre [2] have observed that free grafts seem to have a favorable influence on the vascularisation of the tissues left behind after extirpation of a radiation burn They do not discuss why this should happen

In our opinion this improvement is caused probably by chemotaxis originated by the free graft that is responsible for the unexpected better results The free graft is not only a



FIG 23a Pat B-October '52 treated with X-rays for lupus in 1925 Soon afterwards multiple ulcers developed (Center) b February 1955-Extirpation of carcinoma cheek and nose Eyelids free from carcinoma Repair by free grafts and pedicled flaps (Right) c *CARCINOMA IN RADIATION ULCUS* Between offshoots of carcinoma normal vessels (arrow) and subchronic inflammation



FIG 21 (left) a Pat X 11 12 52 In 1946 treated with X rays for lupus In 1949 treated once more with X rays followed by ulceration (Center) b 23-4-53—After extirpation area covered with free skin graft. Ulcer did not show carcinoma (Right) c *RADIATION ULCUS* The subepithelial layer shows venectasia oedema and fibrinoid degeneration (arrow) Sclerotic cutis nearly without cells and vessels. Probably radiation ulcer in process of formation

cover but in this way also a healing factor in these cases

If our explanation is true this healing effect might be used in other cases We suggest that one might try to prepare an extract of skin for application in an ointment or any other kind of preparation on slowly or badly healing open wounds The use of ground carcinoma tissues does not seem safe and might have consequences that would not be appreciated as a healing procedure.

Till now we have not been able to start experiments based on this idea but we suggest it as a plan that may prove to be worth while trying.

15 Haequartstraat Amsterdam Z Holland

REFERENCES

1 Conway H Stark R B and Joslin D B Plastic and Rec Surg 8 312 1951
2. Dufourmentel Cl and Pierre Maur La Semaine des Hôpitaux de Paris 31 189 1955

L'effet Curatif des Greffes Cutanées sur les Tissus Lesés par Irradiation C F KOCH

Le meilleur traitement de la radionécrose consiste en une excision totale de la masse de tissus pathologiques. Le comblement de la perte de substance par une greffe cutanée libre a surpris l'auteur du fait que la prise était bien meilleure que ce à quoi il s'attendait même sur des zones qui n'avaient pas été totalement débarrassées des tissus pathologiques Il est probable que le chimiotactisme de la greffe stimule la croissance de néovaisseaux Il semble que ce soit le même phénomène qui se produise quand un cancer se développe sur la base d'une brûlure par irradiation. L'auteur suggère la possibilité de préparer un extrait de tissu cutané Des études seront faites pour voir l'amélioration de la vascularisation qu'apporte cette préparation

Die Heilwirkung von Hauttransplantaten auf Strahlengeschädigte Gewebe. C F KOCH.

Die beste Behandlung von Strahlennekrose ist eine totale Exzision der pathologischen Gewebsmassen Bei der Defektdeckung mit freier Haut transplantation waren wir erstaunt, dass die Einheilung des Transplantates viel besser war als wir erwartet hatten selbst da wo die befallenen Bezirke nicht völlig von dem pathologischen Gewebe befreit worden waren. Wahrscheinlich regt das Transplantat mittels Chemotaxis das Wachstum neuer Gefässe an Dasselbe scheint sich zu ereignen wenn ein Carcinom sich auf der Basis einer Strahlenverbrennung entwickelt. Wir vermuten dass es möglich sein kann einen Extrakt von Hautgewebe herzustellen Die Wirkung dieses Präparates auf die Verbesserung der Vascularisation wird experimentell erforscht werden

El Efecto Cicatrizante de los Injertos de Piel en Tejidos Lesionados por Radiaciones. C F KOCH

La mejor terapia para la radio-necrosis es la resección total de la masa de tejidos afectados. Los defectos se cubren con injertos de piel llamando la atención que la integración de esos

injertos sea mejor que la que se esperaba, aun en áreas que no han sido liberadas totalmente del tejido enfermo Probablemente el injerto estimula el crecimiento de nuevos vasos por quimiotaxia

Lo mismo parece suceder si se desarrolla un carcinoma en la base de una quemadura por radiación El autor sugiere que de ser posible se prepare un extracto tisular de piel El efecto en la mejoría de la vascularización por esta sustancia, puede estudiarse en experimentos

---

Burns and Total Body Irradiation—Animal Experiments. BENGT KORLOF, M D, *Uppsala, Sweden*

The following experiments with male guinea pigs, three groups with about 60 animals in each, were made to investigate how burns behaved in combination with ionizing irradiation

Group I was subjected to 250 r total body X-irradiation from an ordinary therapeutic roentgen apparatus

Group II was inflicted with a 3rd degree standard burn on 15 per cent of total body area and in addition, subjected to 250 r total body X-irradiation

Group III was inflicted only with a 3rd degree burn of 15 per cent of total body area

Here I will briefly give the results of the experiments Fig 25 shows how, during the experimental time, the hemoglobin rates of the irradiated animals sank rapidly and had during a couple of weeks significantly lower values than those of the nonirradiated animals The curve underneath shows the difference between the animals with burns only, and those burnt and irradiated This difference sinks below the line marking Likelihood 0 001 and thus is significant

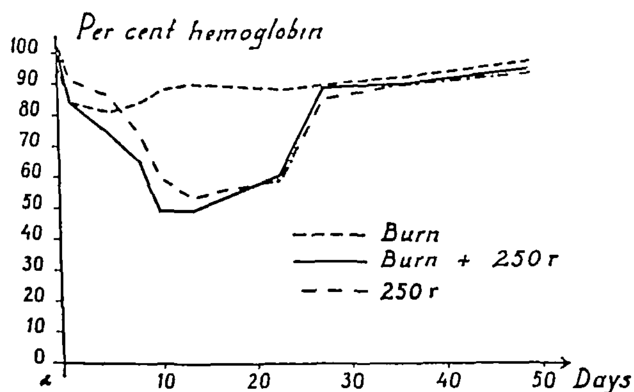
The behavior of the leukocytes after irradiation is shown in Fig 26

The count of the leukocytes is found to be strongly reduced, this reduction being most pronounced 8 to 14 days after irradiation

A continued bacteriological check shows, that bacteriemias in the irradiated animals were usual just during these above-mentioned days In combined damage a parallelism could be observed between bacterial strains isolated from the burns and in those obtained on blood and post mortem cultures The bacterial strains isolated were staphylococcus albus and aureus, enterococci, alpha streptococci, coliform bacteria and, in a few cases, beta streptococci In Group III, with burns only, negative blood cultures were demonstrated

The wound healing process, allowed to take place without a bandage, was continually checked by means of wound photos, which were analyzed With this roentgen dosage, no difference in healing time could be observed between irradiated and non-irradiated animals

In additional experiments, the healing process was followed by means of total excisions of the wounds on both the irradiated and the non-irradiated animals Figures 27 to 30 are examples of the results of this microscopical examination They are taken from the demarcation



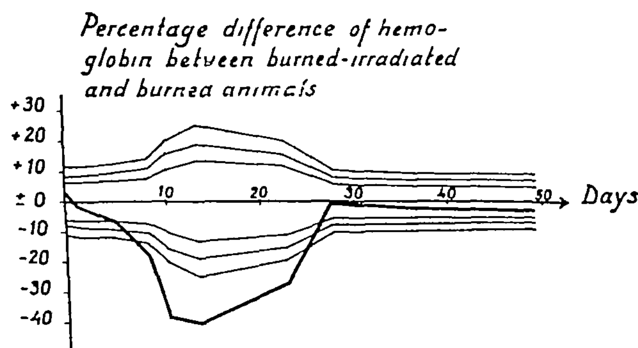


FIG 25

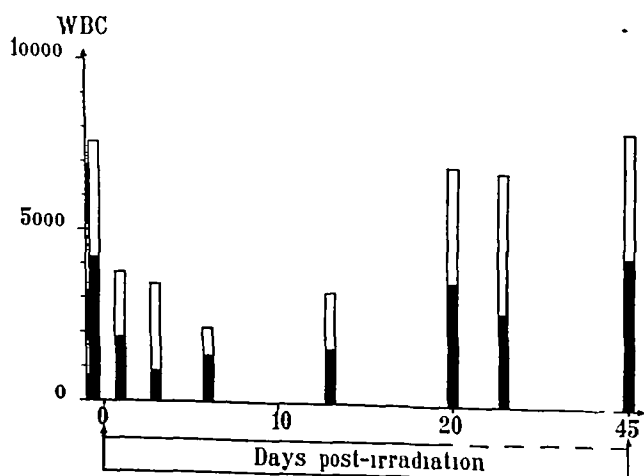


FIG 26



FIG 27 (upper left) A simple 3rd degree burn 5 days after damaging In the boundary zone between the healthy and burnt tissues a rich occurrence of leukocytes is to be seen. (× 400)

FIG. 28 (upper right) A combined damage 5 days after irradiation. Here too a rich occurrence of leukocytes is to be seen (× 400)

FIG 29 (lower left) A burn 11 days after damaging. As in the preceding pictures there is a rich occurrence of leukocytes. (× 400)

FIG. 30 (lower right) A combined damage 11 days after irradiation. There are hardly any leukocytes to be detected. (× 400)

zone of leukocytes between the burnt tissue and the healthy tissue. (400×) (The white blood cell count in the circulating blood of the irradiated animals was at its lowest in this particular period)

The mortality was 37 per cent in Group I that was inflicted with a combined damage, whereas in the groups with burn *or* irradiation, the mortality was about 10 per cent The mortality after irradiation was concentrated on the days 8 to 15 (Fig 31)

The experiments indicate that damages by ionizing irradiation and burns, while mild when appearing singly in combination seriously worsen the prognosis to some degree because of the invasion of bacteria from the wound

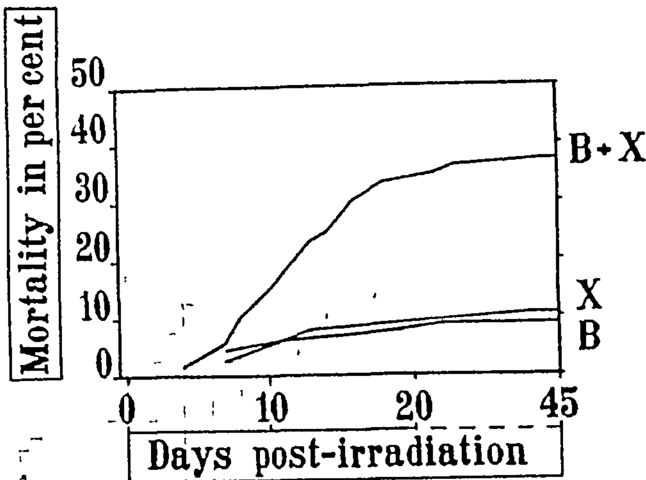


FIG 31 The mortality

This bacterial invasion can take place owing to a defective defensory mechanism in the body after irradiation

Plastikklin avd., Akademiska Sjukhuset, Uppsala, Sweden

Brûlures et Irradiation Totale de L'organisme. Expériences chez L'animal. BENGT KORLOF

On a fait des recherches expérimentales chez le cobaye pour voir quels sont les dégats produits par la combinaison de l'irradiation totale de l'organisme (250 r) et des brûlures (1,5%, 3e degre) Il est apparu parallèlement à la leucopénie consécutive à l'irradiation une mauvaise barrière leucocytaire au pourtour des brûlures chez l'animal irradie En même temps on a noté un parallélisme entre les bactéries isolees à partir des brûlures et celles retrouvees dans les hémocultures et les cultures faites après la mort de l'animal à partir du sang et des divers organes Chez les animaux qui n'avaient pas été irradiés il existait une puissante barriere leucocytaire, une absence de bactériémie et des hémocultures et des cultures postmortem steriles L'augmentation de la mortalité chez les animaux soumis à un traumatisme combine semble dependre en partie de l'évasion bacterielne à partir des brûlures et ce à la suite d'un mauvais mécanisme de défense

Aux doses d'irradiation utilisées, il n'a pas été possible de noter une différence dans le temps de guérison des plaies entre les animaux irradiés et ceux qui ne l'étaient pas Toutefois on a noté chez l'animal irradie des hémorragies et un temps nettement plus long pour le retour à la normale des taux d'hémoglobine

Tierexperimente mit Verbrennungen und Gesamtkorperbestrahlung. BENGT KORLOF

Experimentelle Untersuchungen an Meerschweinchen wurden ausgefuhrt, um die kombinierte Schadigung von Gesamtkorperbestrahlung (250 r) und von Verbrennungen (1,5 Prozent, 3 Grad) festzustellen Parallel der Nachbestrahlungs-Leukopenie bildete sich eine unvollständige Leukozytenbarriere um die Verbrennungen bei bestrahlten Tieren. Gleichzeitig bestand ein Parallelismus zwischen den Bakterien, die von den Verbrennungsstellen isoliert wurden, den Blutkulturen und den postmortem-Kulturen aus dem Blut und verschiedenen Organen Unbestrahlte Tiere waren durch eine starke Leukozytenbarriere, Fehlender Bakteriamie, sterile Blutkulturen und sterile postmortem-Kulturen charakterisiert Die erhohte Sterblichkeit der der kombinierten Schadigung ausgesetzten Tiere scheint zum Teil vom Eindringen der Bakterien von der Verbrennungsstelle auf Grund eines unvollständigen Abwehrmechanismus abzuhangen

In der Heilungsdauer von Wunden bei dieser Rontgendosis konnten bei den bestrahlten und nichtbestrahlten Tiere keine Unterschiede festgestellt werden Bei den bestrahlten Tieren konnten jedoch Blutungen und langsamere Wiederherstellung der bedeutend herabgesetzten Hamoglobin-Werte beobachtet werden

Quemaduras e Irradiacion Total del Cuerpo. Experimentos en Animales. BENGT KORLOF

Se han efectuado investigaciones experimentales en cobayos para estudiar el daño combinado de la radiación total del cuerpo (250 r), y quemaduras, (1½% 3er grado) Paralelamente con la leucopenia post-radiación se presentó una barrera leucocitaria defectuosa en derredor de las quemaduras en los animales irradiados Al mismo tiempo, hubo un paralelismo entre las bacterias aisladas de las quemaduras, hemocultivos y cultivos post-mortem de la sangre de varios órganos En los animales no irradiados se produjo una barrera leucocitaria fuerte, no hubo bacteriemia y los cultivos de sangre post-mortem eran estériles La mortalidad aumentada en los animales con daño combinado (quemadura y radiación), parece depender parcialmente de la invasión bacteriana de las áreas de quemadura por un mecanismo defectuoso de defensa

Con la dosis de radiación usada no pudo investigarse la diferencia en el tiempo de cicatrización de las heridas entre los animales radiados y los no radiados Sin embargo, en los animales radiados se pudieron observar hemorragías y una restitución muy lenta de la cantidad muy baja de hemoglobina que tenían

---

Massive Local Radiation with Effects on Donor Skin and Recipient Areas: Experimental Work on Rats.

DONALD SARGEANT, M D, *Akademiska sjukhuset, Uppsala, Sweden*

INTRODUCTION

The underlying menace of Roentgen rays has been recognized from the inception of their use

With wider application of irradiation modalities on medical diagnosis and therapy in industry and as weapons of war there has been increased study of their effects.

There is a vast literature accumulating concerning observations and research on these effects systemic and local Some of this literature will be discussed later in this paper in relation to the author s findings

Through the years there has been extensive patient material with much clinical experience gained. Short and long range effects on skin and underlying tissues are well known. Much has been done to alleviate these effects especially with the application of plastic surgery principles including early and late skin grafting Little has been written about early skin grafting as a possible deterrent to the deleterious effects of irradiation and thus establish an optimum time for its use

This study was primarily made to ascertain skin grafting possibilities of damaged irradiated areas with application to nuclear weapons victims and radiation therapy patients It was also developed into a study of survival of grafts after irradiation

Materials and Methods

Over 100 female rats, Wistar strain, age 3½ to 4 months weighing 200 to 250 gms were used (see Fig 32) The series include 60 rats (see Table 1) Many of the rats are not reported in the series because they were used for preliminary tests of different Roentgen dosages time of grafting and as controls Others died during the experiments or were unsuitable because of infection Numal intraperitoneally served as an anesthetic during irradiation with occasional ether assist Ether was used during operation and examining procedures

Radiation was delivered by a 57 KV 7.8 MA Chaoul apparatus manufactured by Siemens Total filtration was corresponding to 15-20 mm

Table 1 Number Rats Used in Experiment

Dosage	Rats	Grafting
5000 r	40	
		20 at 2-3 weeks
		10 at 4 weeks
		10 at 6 weeks
2500 r	7	at 3-6 weeks
1500 r	13	at 2-3 weeks
Total	60	

copper which gave a half value layer of 3-4 mm of tissue which was well below the depth of the skin Isodose curves for the tube were worked out 100 per cent of the given dose was delivered to a central area 1 cm in diameter The peripheral area beyond received 50 per cent of the given dosage and a fringe of 2-3 mm received about 30 per cent The irradiated area totaled 2.5 cm in diameter As the dose rate was about 2000 r/min., 44 seconds gave 1500 r 73 seconds gave 2500 r and 145 seconds gave 5000 r

Thirteen animals were given 1500 r seven 2500 r and all others 5000 r (see Table 1) Preliminary testing showed small central necroses developing at 1500 r and a definite 3rd degree skin wound in all cases of 2000 r dosage This latter figure was accepted as the necrosing dosage Therefore when 5000 r was given a necrosis to the fringe areas was expected as at least 2500 r was delivered to most of the field. Actually a central necrosis or 3rd degree wound developed in an area of 1 cm or slightly larger in some cases (see Fig 32) Wounds developed without exception on the 13th or 14th days post radiation The mixed phase of hair follicle development gave fairly uniform thickness of skin.[1, 2] The peripheral area beyond the wound showed epilation edema and erythema. Line of excision for grafting was just beyond this area. A non-irradiated, equal sized section on the dorsum just posterior to the irradiated area was excised and transfer grafting effected (Fig 33) Panniculus carnosus was removed on 23 rats and on 37 by careful dissection it was left in situ Biopsies were taken in irradiated and control areas at time of grafting and in some at various other times Full thickness skin grafts were used.

Only sufficient numbers were grafted and significant differences noted between 2 and 6

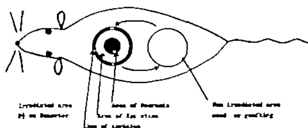


Fig. 32 White Albino (Wistar) Rats 200 to 250 gms—3½ months

weeks to warrant definite conclusions But minor groups of earlier and later grafting and also of split skin grafting will be reported in the discussion

Wounds on the rat heal rapidly and with little or no grossly visible granulation tissue The panniculus carnosus contracts, causing early coaptation of wound edges Wounds caused by radiation and the extent of remaining viable tissue could be measured and checked by carbol-fuchsin dye lines and by black silk suture markers This same technique was used to measure the skin grafts and the amount of take When the grafts failed there was a rapid healing leaving stellate fine line scars This was more rapid than in the non-operated irradiated wounds Because of this, frequent checks were made on graft takes or failures Rather accurate measurements were possible Cases where panniculus carnosus was left in situ were the most difficult to measure, handle and predict

Sterile surgical technique was followed and errors were minimized by having the same operator and technician throughout Penicillin solution was instilled under the grafts and pressure dressings were applied under a bolster covered with an aluminium shield for 5-7 days (see Fig 34) This minimized infection and interference by the animal, a technique used successfully, at this research unit, on hundreds of animals previously, in other projects [3]

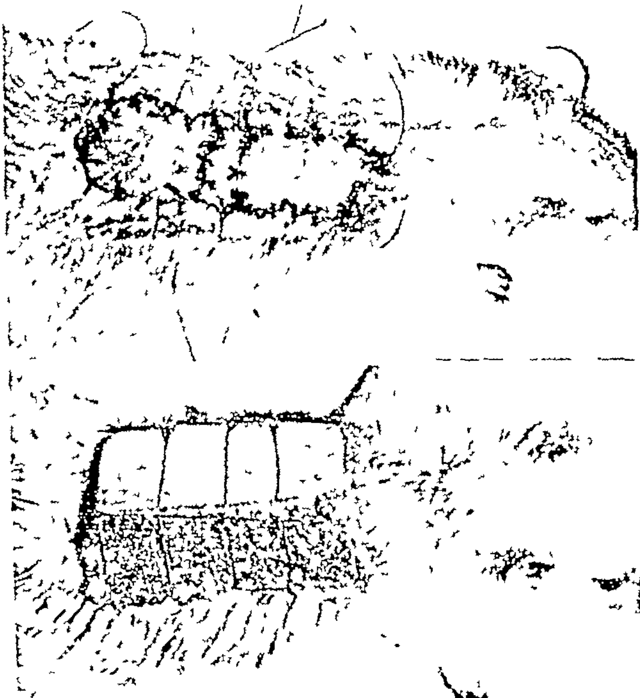


Fig 33 (Upper) Fig 34 (Lower)

RESULTS

Observations with 5000 r

1 Non-irradiated skin to irradiated recipient area Non-irradiated skin from the posterior area (Fig 32) when implanted on an intact panniculus carnosus that had suffered slight damage from the irradiation, averaged between 60-65 per cent take of each irradiated graft (Table 2, col 2) The irradiated, recipient tissue was hyperemic and slightly edematous at the height of the reaction at 2 weeks, and pale by 4 weeks It appeared normal by 6 weeks Microscopically there was edema and vascular dilatation and some inflammatory cellular response at 2 weeks At 4 weeks the acute reaction had entirely subsided and there was less vascularity No plugging of vessels was noted The graft take averaged best when implanted at the inception of the acute phase at 2 weeks, and again when more "normal" conditions prevailed at 6 weeks, about 75 per cent, than at 4 weeks, 50 per cent when apparently most tissue damage had been accomplished on this skin muscle

This same trend prevailed to a less extent when normal skin was grafted onto an irradiated area from which the panniculus carnosus had been removed (see Table 3, col 2) However there was no gross microscopic evidence of penetration through the panniculus carnosus and we considered it otherwise a "normal" recipient area

2 Irradiated skin to non-irradiated recipient area With 5000 r as noted the center necrosed and the peripheral area showed radiation effects by epilation, edema and erythema and mild inflammatory cellular response This irradiated skin from the anterior area when implanted on

TABLE 2 PANNICULUS LEFT IN SITU ON IRRADIATED AND NON-IRRADIATED AREAS

Time in wks of grafting (post irradiation)	Per cent "take" normal skin on irradiated area	Per cent "take" irradiated skin on normal base
2	73	7
3	65	5
4	50	0
6	75	10

TABLE 3 PANNICULUS REMOVED FROM IRRADIATED AND NON IRRADIATED AREAS

Time in wks of grafting (post irradiation)	Per cent "take" normal skin on irradiated area	Per cent "take" irradiated skin on normal base
2	90	75
3	95	10
4	85	0
6	95	20

the posterior area on an intact panniculus carnosus that had not been irradiated did not survive or had a very negligible take (see Table 2 col. 3) The same was true when irradiated skin was placed on an ideal base i.e. with the panniculus carnosus removed (see Table 3 col 3) The exception was that at 2 weeks at the beginning of the severe reaction when central necrosis had just developed there was a 75 per cent average survival!

Observations with 2500 r

The result was as with 5000 r with a slightly smaller central wound and less reaction in the underlying panniculus carnosus Again there is better survival when normal skin is transplanted onto a deeper base in the irradiated area than on the irradiated panniculus carnosus itself Also there was little survival of irradiated skin when transferred to a non-irradiated area either onto panniculus carnosus or deeper tissue Transfers were made at 3 weeks and later and exactly paralleled the findings as given for 5000 r and so will be considered with that group

Observations with 1500 r

There was no central wound except in most cases there was a small superficial necrosis 1 2 mm in diameter There were epilation erythema and edema though, as in the peripheral areas above. Non-operated controls healed in 2-3 weeks with no apparent loss of tissue and hair regenerated in a few weeks though less in amount than in surrounding skin

Ten of the rats of this group were grafted at 2 and 3 weeks with the panniculus carnosus in situ three at 2 weeks with panniculus carnosus removed.

1 Non-irradiated skin to irradiated recipient area. As expected, the posterior normal skin of the 10 grafted at 2 and 3 weeks, took quite well on the only slightly affected irradiated anterior bed of panniculus carnosus. On the 3 grafted at 2 weeks on the deeper bed the take was 100 per cent

2 Irradiated skin to non-irradiated recipient area The irradiated skin when grafted onto panniculus carnosus in the non-irradiated posterior area had a poor survival of only 30 per cent average of each graft both at 2 and 3 weeks. Significantly though there was a 100 per cent survival of the 3 grafted at 2 weeks where the panniculus carnosus was removed and the deeper muscle and fascia acted as a better and more stable base.

Because 1500 r is below the wound dosage these 13 animals are not included in tables 2 and 3 They were used as checks or controls but because the findings supported the results of the higher dosage series their significance will be discussed

DISCUSSION AND CONCLUSIONS

Summary of radiation effects

1 Non irradiated skin grafted onto irradiated but radio-resistant panniculus carnosus survives in all cases but never a 100 per cent take, in the early post-irradiation weeks Poorest survival was at 4 weeks

Control Non-irradiated skin grafted onto panniculus carnosus base takes 100 per cent.

2 Non irradiated skin grafted onto irradiated areas from which panniculus carnosus was removed survived much better but not 100 per cent in any case as in the controls Poorest survival again was at 4 weeks.

Control Non irradiated skin grafted onto non-irradiated deep fascia and muscle takes 100 per cent

3 Irradiated skin with central necrosis and a damaged peripheral area (2500-5000 r) always had a complete failure at 2 3 4 and 6 weeks if grafted onto panniculus carnosus

Control Irradiated skin with same dosage and damage as above always survived 100 per cent except for the central necrosis, if left in situ and if no operative procedures were attempted.

4. Irradiated skin with 5000 r dosage as above failed also as grafts on deeper muscle and fascia except at 2 weeks post irradiation at which time there was a 75 per cent average

survival Most or all of the peripheral areas took as a graft[1]

Control As 3, above.

5 Irradiated skin with subnecrosing dosage of 1500 r largely fails as a graft if transferred onto panniculus carnosus at 2 and 3 weeks

Control Irradiated skin of same dosage and damage as above heals without loss if left in situ

6 Irradiated skin of 1500 r, when grafted at 2 weeks onto the deep base, from which panniculus carnosus has been removed, survives 100 per cent

Control As 5, above

7 To test survival of grafts before any radiation effects were apparent, 5000 r dosage was used, panniculus was removed and transfer of the irradiated skin made onto the deep base One animal was grafted 1 hour post radiation and two on the 3rd day The grafts failed almost 100 per cent

8 Further testing of very early grafting was done with split skin Graft was taken from irradiated area immediately after 5000 r irradiation and included all the central area that would necrose 2 weeks later Panniculus carnosus was removed from recipient area Fifty per cent average area survival was inconclusive, though central area appeared to survive as well as peripheral area As only 3 rats were used, and one time of grafting, this small series like number 7, above, was not reported in the tables, but suggests immediate split skin grafting as a possibility in known irradiated areas of even very heavy dosage

9 Later grafting, at 3 months, with 5000 r, and a deep bed recipient area gave "take" results of about 50 per cent Because of the advanced healing with retraction of wound edges which made measurements difficult, it was not considered significant It served as a basis for time limitation of early skin grafting

10 Viability of 5000 r irradiated skin was tested in another series of 5 animals Oxygen consumption[4] was measured by Warburg apparatus[3] immediately after exposure and on the 1st, 5th, 8th and 12th post radiation days (Table 4) Sections were taken from central area, while control sections came from an equivalent section of non-irradiated skin on the same animal Different control values show the normal variation of different animals The drop at

TABLE 4 OXYGEN CONSUMPTION (Ml/mg of dried weight)

Time	Control area	Irradiated area
Day of irradiation	0 131	0 362
1 day after irradiation	0 215	0 216
5 days after irradiation	0.312	0 329
8 days after irradiation	0 102	0.286
12 days after irradiation	0 572	0 196

8 days corresponded to observed early microscopic changes[2, 3] A greater drop at 12 days paralleled greater microscopic changes, though as yet there was no gross change The skin appeared the same as surrounding normal skin The radiation wound appeared suddenly 2 days later

Discussion of radiation effects

Two postulates emerge from the above data First, irradiated skin is sensitive to stress and will survive only under ideal conditions, Second, the optimum time for transferring of irradiated skin and the only time at which survival can be expected is at 2 weeks The second fact is based on the first Two factors seem largely responsible for these destructive effects, direct action on cells, and impaired circulation It is not in the scope of this work to analyze which plays the predominant role, if any

It was noted that grafts on irradiated tissue, "took" the least at 4 weeks when tissue repair in the skin was advanced, but vascular effects though slight in the recipient area were at their greatest At the height of the reaction in the skin, at 2 weeks, the underlying tissue was about the best for a recipient area Devik[5] checking vascular effects by means of micro-angiography and other methods, with similar dosage, on hairless mice, noted that circulation was unimpaired at height of reaction and that these effects lagged behind the direct radiation effects The grafting results thus harmonize with that observation

It is more difficult to explain why the irradiated skin takes best, i e, at 2 weeks, when the direct radiation effects in the cells are most pronounced It would seem to be the most sensitive at this stage but the reverse is true A second factor is necessary, a good recipient area must be provided When these conditions are met the sensitive irradiated skin seems to survive as well, or nearly so, as when left in situ

A change of either factor caused a loss of the graft. This was true with both 5000 r and 1500 r

It is well known that irradiated tissue needs a good blood supply [3] Two fatalities are reported by Daland [6] that resulted from necrosis in the irradiated areas after ligation of the external maxillary artery for hemorrhage Ungar and Warren [7] transplanted irradiated epidermis onto non irradiated dermis on rabbits ears and had 30 per cent survival Non irradiated epidermis however did not survive on irradiated dermis The inference from this could be that interference with blood supply in the irradiated dermis even though slight caused the failure of the epidermis grafts The above evidence emphasizes the need for good vascularity in irradiated tissues Devik [5] proved the beneficial effect of neighboring non irradiated cells in the salvation of irradiated cells that would otherwise succumb

In planting our 2 weeks grafts deep both good blood supply was assured and a "healthy tissue environment obtained i.e., the panniculus carnosus traumatized by removal of the skin was also removed The panniculus carnosus glides over the deeper structures and can be removed with minimal tissue disturbance Neither factor is ruled out in this procedure Injury and recovery may be influenced to a considerable extent by the physiological interplay in the organ as a whole [9] Thus toxic products of irradiation would be removed better under some conditions than in others and the "virtues" of healthy cells exert their influence better

In applying the above principles to clinical use restraint must be used Much more surgery could be performed on radiation therapy patients to relieve the effects of both superficial and deep penetration With nuclear weapons casualties the general condition of the patient is of prime concern Radiation sickness is usually apparent within 2 weeks [9] Prior to that because of the apparent viability of even heavily irradiated skin, vigorous measures can be taken Dr Miki [10] reports the superiority of mechanical removal of ionizing substances from the skin Some authorities [10] ascribe increased keloid formation to radiation effects Other [11] disagree but in any case it is a serious problem of the atomic age where large numbers are injured Early grafting with bold excision of irradiated tissue would be reasonable if the general effects were not great Non irradiated split skin should be available as extensive exposure would give more than a lethal (700 r to general body area) dosage [12]

If irradiated skin is used it must have a good bed i.e fascia or granulation tissue. Whole skin should be used at 2 weeks if used at all in the early post irradiation period Split skin possibilities have not been explored fully but it is reasonable to suppose that the same principles apply for its use It should have a wider range of use than whole skin.

Rat skin has many of the same reactions as human skin and the same effects reported above have been reported for human skin

In all cases sound surgical principles should be observed. There is nothing in this work to discourage the increasing tendency toward "radical" surgery even in early post radiation patients

ACKNOWLEDGEMENTS

This work is a part of a research project on skin grafting headed by Tord Skoog M. D., Plastic Surgery Unit University of Uppsala Sweden and financially supported by the Swedish Defense Medical Research Committee. Bengt Nohrman M D., guided in the radiation aspects of the experiment Miss Brita Akerblom assisted in all the work with great interest

To above organizations and individuals my grateful thanks.

REFERENCES

1 Geary Jr John, R Effects of roentgen rays during various phases of the hair cycle of the albino rat Am J Anat 91 51 106, July 1952.
2 Argyris, Thomas S The relationship between the hair growth cycle and the response of mouse skin to x-irradiation. Am. J Anat., 94 439-472, May 1954
3 Skoog, Tord An experimental and clinical investigation of the effect of low temperature on the viability of excized skin. Plast and Reconstr Surg., 14 403-416 Dec 1954
4 Butcher Earl O The oxygen consumption of the skin during the hair cycle in the white rat Am J Phys 138 408-411 Feb 1943
5 Devik Finn A study of the local roentgen reaction on the skin of mice with special reference to the vascular effects Acta Radiologica, Suppl 199 1955
6 Daland, E M Radiation damage to tissue and its repair Surg., Gynec Obstet 72 372 383 1941
7 Ungar J and Warren, S Skin grafting as a

method of determining the biologic effect of radiation Arch Path 23 299-306, 1937

8 Patt, H M Radiation effects on mammalian systems Ann Rev Phys 16 51-80, 1951

9 Liebow, A A, Warren, S, and De Coursey, E Pathology of atomic bomb casualties Am J Path, 25 853-1027, No 5, 1949

10 Miki, Isaharu Experiences of atomic bomb burns in Japan First International Congress of Plastic Surgery, 1955

11 Wells, W, and Tsukifuji, N Scars remaining in atom bomb survivors S G O, 95 129-141, Aug 1952

12 Atz, R V Medical aspects of nuclear energy Ill Med J, 101 299-302, June 1952

Irradiation Massive Avec Efféts sur les Zones Cutanées du Donneur et du Receveur. Etude Experimentale chez le Rat. DONALD SARGEANT

De nombreuses series de rats ont été irradiées sur une zone dorsale locale aidé de différentes doses de rayons X On a fait des greffes cutanees à partir de zones irradiées sur des zones non irradiées à divers intervalles Les zones les moins irradiées conviennent à des prélèvements de greffe cutanée pour des zones necrosees Il semble qu'il y ait une meilleure circulation et une meilleure prise des greffons quand la greffe est faite de façon précoce Ces principes devraient être appliqués pour la réhabilitation précoce d'éventuelles victimes de bombes atomiques ayant reçu une irradiation importante

Massive Bestrahlung, ihre Wirkung auf die Spenderhaut und die Empfangerregion Experimentelle Untersuchungen an Ratten. DONALD SARGEANT

Zahlreiche Serien von Ratten wurden uber einen umschriebenen Bezirk am Rucken mit verschiedenen Rontgendosen bestrahlt Hauttransplantate von bestrahlten und nichtbestrahlten Bezirken wurden mit verschiedenzeitlichen Zwischenraumen ubertragen Weniger bestrahlte Bezirke eigneten sich als Spenderhaut fur nekrotisierte Bezirke Es scheint, dass eine bessere Zirkulation und besseres Einheilen der Transplantate stattfindet, wenn die Transplantation fruhzeitig ausgefuhrt wird Diese Prinzipien konnten fur die fruhe Wiederherstellung selbst ausgedehnter Strahlenverbrennungsopfer von Atombomben angewandt werden

Radiacion Masiva Con Efectos en la Piel Donadora y Receptora Trabajo Experimental en Ratas DONALD SARGEANT

Series múltiples de ratas fueron irradiadas en una zona del área dorsal, con dosis variantes de rayos X Se transladó piel de zonas irradeadas a las no irradeadas a diferentes intervalos de tiempo Las zonas menos irradeadas son adecuadas como donadoras cutáneas a áreas necrosadas Parece haber mejor circulación y mejor integración de los injertos cuando el proceso se ejecuta tempranamente Estos principios pueden ser aplicados a la rehabilitación temprana de víctimas extensamente irradeadas de bombas atómicas

---

Treatment of Chronic Ulcers, Caused by Phosphorus Burns, by Means of Plastic Surgery. KARL SCHUCHARDT, M D, Professor, *Hamburg, Germany*

During the last war yellow phosphorus was used frequently as shell charge and typical injuries were caused by it The damage to the body surface caused by phosphorus presents a combination of flame burn and chemical burn

The burn comes about by ignition of the liquid phosphorus on the skin The combustion turns the phosphorus into orthophosphor pentoxide which, drawing fluid from the tissues, forms phosphoric acid (HPO) The acid develops a strong caustic effect and aggravates the tissue damage caused by the burn (Banzer) It is often difficult to decide in each single case—as Konjetzny points out—whether a burn which was acquired on the occasion of the explosion of a phosphorus bomb is a direct immediate damage by the phosphorus or the effect of the heat through objects, such as pieces of clothing or wood, which have caught fire

During the air raids on Hamburg in 1943 numerous civilians sustained severe injuries through the explosion of phosphorus bombs The victims were partly cooped up in cellars or enclosed by debris, some of them driven out of the shelters and getting out on the streets which were partly covered with burning phosphorus

The developing burns were mostly very severe, extending deeply and characterized by poor healing tendencies

Within the scope of my paper I cannot enlarge on the primary therapy of phosphorus burns The essential means of treatment are the removal of all contaminated hair and clothes and the removal of the phosphorus from the body surface by washing or bathing The often recommended application of copper sulfate solution in order to "enwrap" the phosphorus particles may only be indicated in emergency cases However this treatment cannot replace the effect of washing the wounds or bathing the patient with water to which soothing drugs as sodium

bicarbonate or detergents (synthetic soaps) are added. The wounds are covered with bandages initially moistened with neutralizing alkaline solutions (sodium bicarbonate 3 to 4 per cent or sodium carbonate) (Banzer) Later the usual treatment of open granulating wounds by application of moist saline dressings is recommended then wound excision and free skingraft as soon as possible

I have no experience of my own in this matter of early care as patients with severe extensive scarification and ulceration on the limbs and the back were sent to me only after the war with the diagnosis "phosphorus burn" Two examples of this kind with the characteristic defects, reaching deep into the subcutaneous tissue are shown in Figs. 35 and 36

In two other cases extensive ulcerations on the lower leg as residuals of burns of the whole leg were present There was no difference from chronic varicose ulcers except for the especially deep scars and the conspicuous resistance against any type of conservative treatment The therapy was in all details the same as that which I have employed with good success in chronic ulcerations of the lower leg of varying etiology in more than thirty cases With moist dressings and elevation of the leg the suppurating ulcers were cleansed. After the customary bacteriological tests and the determination of the resistance of the respective germs against antibiotics the ulcers including the neighboring damaged skin and the deep fascia, was excised Immediately following the excision the wound surface was

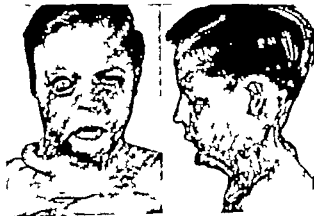


Fig 35 16-year-old boy injured by phosphorus bomb explosion at age of 5 years. The scar tissue was partly replaced by another surgeon using a tubed flap from the back. (Condition before assuming the treatment.)



Fig 36 Left 30-year-old female injured 12 years ago by explosion of phosphorus bomb. The chronic ulcer overlying the sacrum is surrounded by scarred skin

Right Condition about four weeks after free skin graft

covered with split skin grafts of medium thickness.

From experience gained with circular ulcerations the leg is suspended on a calcaneus nail post-operatively In this way one can avoid pressure sores on the lower circumference of the shank and can reliably achieve an undisturbed healing of the skin graft. Compression bandages are left in place for 12 days unless infection should occur The treatment after the graft has "taken" is of great importance We carry it out according to the principles developed by Neal Owens. It is my impression that by letting the leg hang down for periods with increasingly shorter intervals one can achieve an increase of the subcutaneous cellular tissues. My explanation is that by capillary hemorrhages the formation of granulating tissues between graft and graft bed is stimulated and thus also the formation of subcutaneous tissues

The illustrations Figs. 37 and 38 show two patients with crural ulcers after phosphorus burn before and after the treatment. Both patients have remained free of recurrence for three and four years respectively post operative

Summarizing it may be stated that the therapeutic principles of scarred skin defects and ulcerations caused by phosphorus burns differ in no way from that customary in ulcerations of other etiology

Hamburg 13 Germany
Johnsallee 3

bicarbonate or detergents (synthetic soaps) are added. The wounds are covered with bandages initially moistened with neutralizing alkaline solutions (sodium bicarbonate 3 to 4 per cent or sodium carbonate) (Banzer). Later the usual treatment of open granulating wounds by application of moist saline dressings is recommended, then wound excision and free skingraft as soon as possible.

I have no experience of my own in this matter of early care as patients with severe extensive scarification and ulceration on the limbs and the back were sent to me only after the war with the diagnosis "phosphorus burn." Two examples of this kind with the characteristic defects reaching deep into the subcutaneous tissue are shown in Figs. 35 and 36.

In two other cases extensive ulcerations on the lower leg as residuals of burns of the whole leg were present. There was no difference from chronic varicose ulcers except for the especially deep scars and the conspicuous resistance against any type of conservative treatment. The therapy was in all details the same as that which I have employed with good success in chronic ulcerations of the lower leg of varying etiology in more than thirty cases. With moist dressings and elevation of the leg the suppurating ulcers were cleansed. After the customary bacteriological tests and the determination of the resistance of the respective germs against antibiotics the ulcers including the neighboring damaged skin and the deep fascia was excised. Immediately following the excision the wound surface was covered with split skin grafts of medium thickness.



FIG. 35 16-year-old boy injured by phosphorus bomb explosion at age of 5 years. The scar tissue was partly replaced by another surgeon using a tubed flap from the back. (Condition before assuming the treatment.)



FIG. 36 Left: 30-year-old female injured 12 years ago by explosion of phosphorus bomb. The chronic ulcer overlying the sacrum is surrounded by scarred skin.
Right: Condition about four weeks after free skin graft.

From experience gained with circular ulcerations the leg is suspended on a calcaneus nail post-operatively. In this way one can avoid pressure sores on the lower circumference of the shank and can reliably achieve an undisturbed healing of the skin graft. Compression bandages are left in place for 12 days unless infection should occur. The treatment after the graft has "taken" is of great importance. We carry it out according to the principles developed by Neal Owens. It is my impression that by letting the leg hang down for periods with increasingly shorter intervals one can achieve an increase of the subcutaneous cellular tissues. My explanation is that by capillary hemorrhages the formation of granulating tissues between graft and graft bed is stimulated and thus also the formation of subcutaneous tissues.

The illustration Figs. 37 and 38 show two patients with crural ulcers after phosphorus burn before and after the treatment. Both patients have remained free of recurrence for three and four years respectively post operative.

Summarizing it may be stated that the therapeutic principles of scarred skin defects and ulcerations caused by phosphorus burns differ in no way from that customary in ulcerations of other etiology.

Hamburg 13, Germany
Johnsallee 3

tions are of considerable technical difficulty and during or immediately after a period of rapid circulatory exchanges the difficulties are so great and the possible inaccuracies so large as to make blood volume estimations of little value for general use

Weighing of swabs is a well-known method of estimating blood loss and is of help during the course of an operation In burns excisions, however, it does tend to give an unduly low estimate of loss, as some blood inevitably gets on to towels, gowns and gloves and is not accounted for Furthermore, the weighing of each separate swab has a small potential error and the summation of a number of weighings may contain a substantial total discrepancy

The idea of weighing the whole patient to determine blood loss during an operation was suggested to me by my friend A J H Rains, M S, F R C S, (Rains 1953) of the Queen Elizabeth Hospital, Birmingham He uses this method during abdominal and thoracic operations and for our purposes it was necessary to make certain modifications

The following method was evolved and seems to contain the minimum of sources of error

An ordinary chair weighing machine is used with a stretcher adapted to fit firmly over the arms First, all the blood which has been cross-matched in readiness is weighed (Weight A) In the meantime the Theatre Sister places on a sterile tray a generous excess of all the dressings which may be necessary Then the patient, naked, anaesthetised and with the endotracheal tube in place and with the intravenous drip running on saline, is placed on the stretcher, a sterile mackintosh is placed on his thighs and the tray of dressings on top of this The blood is still on the chair and the total weight is estimated (Weight B) The operation is now performed

At the end of the operation the patient with his dressings now in place and with the endotracheal tube and intravenous drip in situ is placed once more on the stretcher Any excess dressings and the excised slough are placed on the tray which with the mackintosh is balanced on the thighs as before If a bottle of blood is running, this is replaced temporarily by saline, and all previously weighed bottles of blood, full, empty or part full are placed on the chair and the total weight again estimated (Weight C)

Finally the blood bottles are weighed again (Weight D)

The difference between Weight B and Weight C indicates the total blood loss, for the only thing not included in C is the blood shed at operation The difference between Weight A and Weight D gives the amount of blood transfused

It is our practice, when weighings have been performed, to give blood rapidly to make good any deficit remaining at the end of operation Transfusion is then continued at a slower rate to replace any oozing into the dressings, the extra amount given being up to one half of the operative blood loss

The accompanying Table 1 gives details of estimations performed for excisions of different areas In an attempt to predict the amount likely to be required in future cases we have related the blood loss to the percentage area excised and to the body weight in a manner similar to the various formulae for treating burns shock

It will be seen that the loss from operations on the face is highest, the limbs lowest and the trunk intermediate

TABLE 1

Patient	Wt in KG	Per cent W S L excised	Site	Whether grafted	Blood loss at operation	Transfusion at operation	Blood loss in G /KG /% area
N G	33	1	Trunk	No	84 G	0	2 5
E.B	45	3	Face	Yes	1760 G	1330 G	13 0
F F	45	5	Trunk	Yes	1008 G	794 G	3 4
H C	63	6	Leg	Yes	250 G	530 G	0 7
B C	65	9	Trunk	No	1530 G	567 G	2 4
J E	63	12	Trunk	Yes	2200 G	2400 G	3 0
S G	16	14	Trunk	No	600 G	620 G	2 7
F G	70	20	Legs	No	1900 G	1500 G	1 4
L R	48	20	Arm and	No	1100 G	1000 G	1 1
R H	11	20	Trunk	No	700 G	400 G	3 0

C Some General Effects in Burns (Circulation, Septicemia)

Early Excision of Burns with Particular Reference to Blood Replacement

IAN F K MUIR, M B, F R C S, AND MICHAEL GRUMMITT, M B B S, F F A. R C S *The Plastic Centre, Mount Vernon Hospital, Northwood, England*

It is now widely accepted that the ideal treatment for an area of full thickness burning is by early excision and grafting Various difficulties may make it impossible to achieve this ideal—it may for instance be impossible at an early stage to know how much of the burn is full thickness and should be excised and how much is partial thickness and may safely be left We propose however to consider only those cases in which it is possible to make a clear decision to perform excision and to discuss certain features of the operations

The paper is based on the experiences of the group of surgeons and their anaesthetic colleagues at the Mount Vernon Centre for Plastic Surgery Northwood England

(a) *Time at which excision should be performed* The aim of early excision of burns is to remove dead tissue so that infection is minimized and the absorption of toxic products avoided. To conform with the principles of treatment of wounds of other types excision should preferably be performed within a few hours of injury and with burns of the order of 5 per cent of body surface this is widely practised and presents no special difficulties Excision of much larger burns in the first twenty four hours has been advocated and practised by Douglas Jackson (Jackson 1954) of Birmingham but we have felt that the superimposition of the effects of blood loss on those of burns shock would create too difficult a problem for our resources On the other hand we have noticed that a number of our seriously burned patients after having passed successfully through the shock period and having been well for a few days started after the end of the first week to go downhill so that a number of deaths have occurred during the second or third weeks In an attempt to abort this course we now attempt when possible to carry out excision on the third fourth or fifth days in other words as soon as the shock period is safely over and the circulation is stable

(b) *Depth at which the excision should be performed* After having tried various methods we now carry out the excision at a plane immediately superficial to the deep fascia by scalpel dissection This can be performed rapidly and gently the bleeding points are few and can be easily picked up the chances of leaving behind non viable fat are eliminated and the layer of fine areolar tissue on the deep fascia gives a good bed for a graft We have tried excision by Blair and Humby knife and by electric dermatome but at this time (i.e 3-5 days) we have found these method to be slow and bloody and sometimes to leave behind damaged tissue which takes grafts poorly

(c) *Amounts which should be excised and whether grafting should be performed at the same time as excision* Some of the earlier patients became severely shocked during these operations and we were accordingly cautious about the extent of the excision Furthermore we not infrequently deferred the cutting of grafts to a second operation two days later for fear of causing further shock. Recent work (Grant & Reeve 1951) has emphasized that diminution of circulating blood volume is the single factor of over riding importance in the causation of the shock state of trauma and that if the blood volume is continuously maintained even very extensive injuries are compatible with recovery There is good reason to suppose that the same argument applies to the shock of excision of a big burn and that if the blood volume is continuously maintained very large areas of skin may be safely excised

By paying more attention to quantitative replacement of blood loss we have had much less anxiety about the patients, have excised large burns with confidence and have proceeded to grafting at the same operation cutting as many autografts as possible and using homografts whenever necessary to give complete cover

(d) *Estimation of blood loss at operation* Since the maintenance of blood volume is the important factor frequent blood volume estimation would seem to be the obvious method of control. Unfortunately however these estima

finally indicates that shock alone produces central liver necrosis

Murakami in 1933 studied the albumin-globulin ratios of four patients suffering from burns and found that the globulin portion was somewhat increased at the expense of the albumin portion Ten years later Shedlovsky and Scudder showed an increase in the alpha globulin fraction of a single patient with burns In 1951, Evans et al concluded that an alteration in the albumin-globulin ratio is the most constant effect of the liver injury after burns The first known systematic electrophoretic study of a series of human burn patients is from Prendergast et al in 1952 In severe burns they find a great increase in gamma-globulin concentration which appears to provide the best index of burn severity

Methods

The Wistar rat was used as the test animal A scald burn of the back was produced by immersion in a constant temperature bath When the shaved animal reached a weight of exactly 200 grams it was anesthetized and placed in a plaster cast (Arturson 1955) protecting the total body surface except 20 per cent which was left in contact with the hot water (Fig 39) This burning procedure is very simple The limit between burned and normal skin will be sharp and the burned area can be determined previously The total body surface was calculated from the formula $S=KW^{0\,60}$ ($K=12\,62$), given by Lee for the white male rat The rats were immersed for 30 seconds at a bath temperature of 92°C which gave a third degree burn The animals were divided into three experimental groups

Group I Controls
Group II Burned without treatment
Group III Burned treated intraperitoneally with a solution of Ringer type (Salidex, Pharmacia)

Infection was strictly controlled by local and general measures The rats were killed after 24 hours and blood was taken from the carotids by decapitation

Observations

During the first twelve hours after the burn most of the rats in Group II did not drink at all but all rats in Group III drank some water

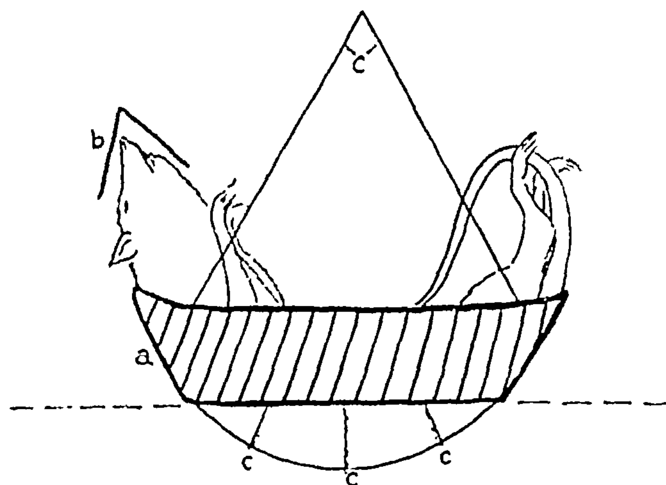


Fig 39 Plaster cast (a) with stainless steel wires (c) and narcosis mask (b)

The urinary output is reduced in the burned untreated animals and the first urine of rats with severe burns is strongly acid and hemoglobinuria is present No animals in Group II showed any interest in food during the first twenty-four hours postburn The rats in Group III showed great individual variation with respect to food intake

One of the animals in Group II was examined one hour after burn The liver was intensively red and the very rapid haemoconcentration gave capillary stasis (Fig 40) The haematocrit was 64 per cent (the normal value is about 40)

When the animals are killed twenty-four hours postburn you can see histopathological and histochemical changes in the liver cells A marked engorgement of the sinusoids of the liver is one of the first changes which develops during the earliest hours after burn The affected nuclei are swollen and hydropic with their outlines cling to the nuclear membrane (Fig 41) At an early stage vacuoles appear in the cytoplasm (Fig 42) They are free from histologically visible fat and glycogen and the Millon reaction is negative You can also find liver cells with pyknosis and poorly stained cytoplasm (Fig 43) These changes are in addition to the zonal necrosis (Fig 44) which develops somewhat later localized to the central part of the liver lobules The liver changes are not so widespread in the animals treated with Ringer solution In the burned untreated animals there is moderate fatty infiltration and the glycogen disappears from the liver In the burned rats treated with Ringer solution, however, the liver is stored with glycogen (Fig 45) The

REFERENCES

1 Jackson, Douglas Paper read at Meeting of British Association of Plastic Surgeons but not published (1951)
2 Grant R. T., and Reeve F B General effects of injury in man H M Stationery Office 1951
3 Rains A J H Br Journ Surg., 41 312 1953

Excision Précoce des Brûlures en Référence Particulièrement au Remplacement Du Sang. IAN F K. MUIR ET MICHAEL GRUMMITT

Au Mount Vernon Centre for Plastic Surgery à Northwood, Angleterre l excision des brûlures est pratiquée dès que possible le 3e 4e ou 5e jour c est-à-dire dès que la période de choc a été dépassée

L excision est faite entant que procédé de routine immédiatement au-dessus du fascia profond.

Le choc au cours d une telle intervention est dû à la perte de sang et à la diminution du volume du sang circulant. Si on prend la précaution de remplacer de façon correcte le sang perdu les malades ne seront pas choqués

Les apprécmations du volume sanguin ne conviennent pas de façon générale dans ce genre d intervention *La pesée des compresses peut aider* mais peut donner une estimation trop basse de la perte du sang totale aussi les auteurs décrivent ils une méthode de pesée du malade avant et après l opération qui permettra de mesurer de façon précise la quantité de sang perdu

Le tableau rapporté dans l article montre les résultats chez 10 malades.

Frühausschneidung von Verbrennungen mit besonderer Berücksichtigung des Blutersatzes. IAN F K MUIR UND MICHAEL GRUMMITT

In dem Mount Vernon Zentrum für plastische Chirurgie in Northwood England wird die Ausschneidung von Verbrennungen wenn moglich am 3 4 und 5 Tage ausgeführt d.h sobald die Schockperiode vorüber ist Die Exzision wird routinemässig in der Schicht *unmittelbar oberhalb* der tiefen Fascie ausgeführt

Ein Schock wahrend dieser Operation beruht auf dem Blutverlust und der Verminderung der zirkulierenden Blutmenge Wenn der Blutverlust völlig ersetzt werden kann erleiden die Patienten keinen Schock.

Schätzungen der Blutmenge sind für den Allgemeingebrauch bei diesen Zuständen nicht ausreichend Das Wiegen der Tupfer ist eine Hilfe kann aber eine zu niedrige Schätzung des Gesamt blutverlustes ergeben und eine Methode den Patienten vor und nach der Operation zu wiegen die eine genaue Schätzung des Blutverlustes ergibt, wird beschrieben Die Tabelle zeigt die Ergebnisse bei 10 Patienten.

Excision Temprana de Quemaduras con Particular Referencia al Reemplazo Sanguineo. IAN F K MUIR Y MICHEL GRUMMITT

En el centro de cirugía plástica de Mount Vernon en Northwood Inglaterra, se hace la excisión del tejido necrótico de la quemadura tan pronto como el período de shock ha terminado, esto es del tercero al quinto día

La excisión se hace de rutina a un nivel inmediatamente superficial a la fascia profunda.

El shock que se presenta durante éstas operaciones es debido a la perdida sanguínea y a la disminución del volúmen de sangre circulante

Si se repone la sangre perdida el shock no se presenta

Las estimaciones de volumen sanguíneo no son adecuadas en éstas condiciones Se describe un método en que el peso pre y post-operatorio del paciente produce una estimación aceptable de la perdida sanguinea

Se muestra una tabla con los resultados obtenidos en 10 pacientes

---

A Preliminary Report on Some Effects of Severe Experimental Burns in the Liver Cytology and the Serum Electrophoresis Pattern.

GÖSTA ARTURSON M D, *Histologiska Institutionen, Uppsala, Sweden*

Changes in the function of the liver can certainly exert a more or less important influence on several different organs Because of the fact that the main part of the organic constituents of the serum is synthetized by the liver cells this close relationship deserves special attention. It seems thus to be justified to compare a cytological investigation of the liver with a simultaneous study of the serum composition

As long ago as 1899 Bardeen published a review of the pathology of severe burns and noted a diffuse injury to all the liver cells. Later there have been reports by Wilson Gillman and Gillman and many more of a different type of injury characterized by focal necrosis of the central cells of the lobules In 1941 Wells showed that this necrosis was due to tannic acid poisoning According to Lee however there is still some liver necrosis in burns when tannic acid is not used In 1943 Hartmann and Romence showed that large experimental burns resulted in marked engorgement of the sinusoids of the liver and granular vacuolar and fatty degeneration Modern work by Ellenberg, for example

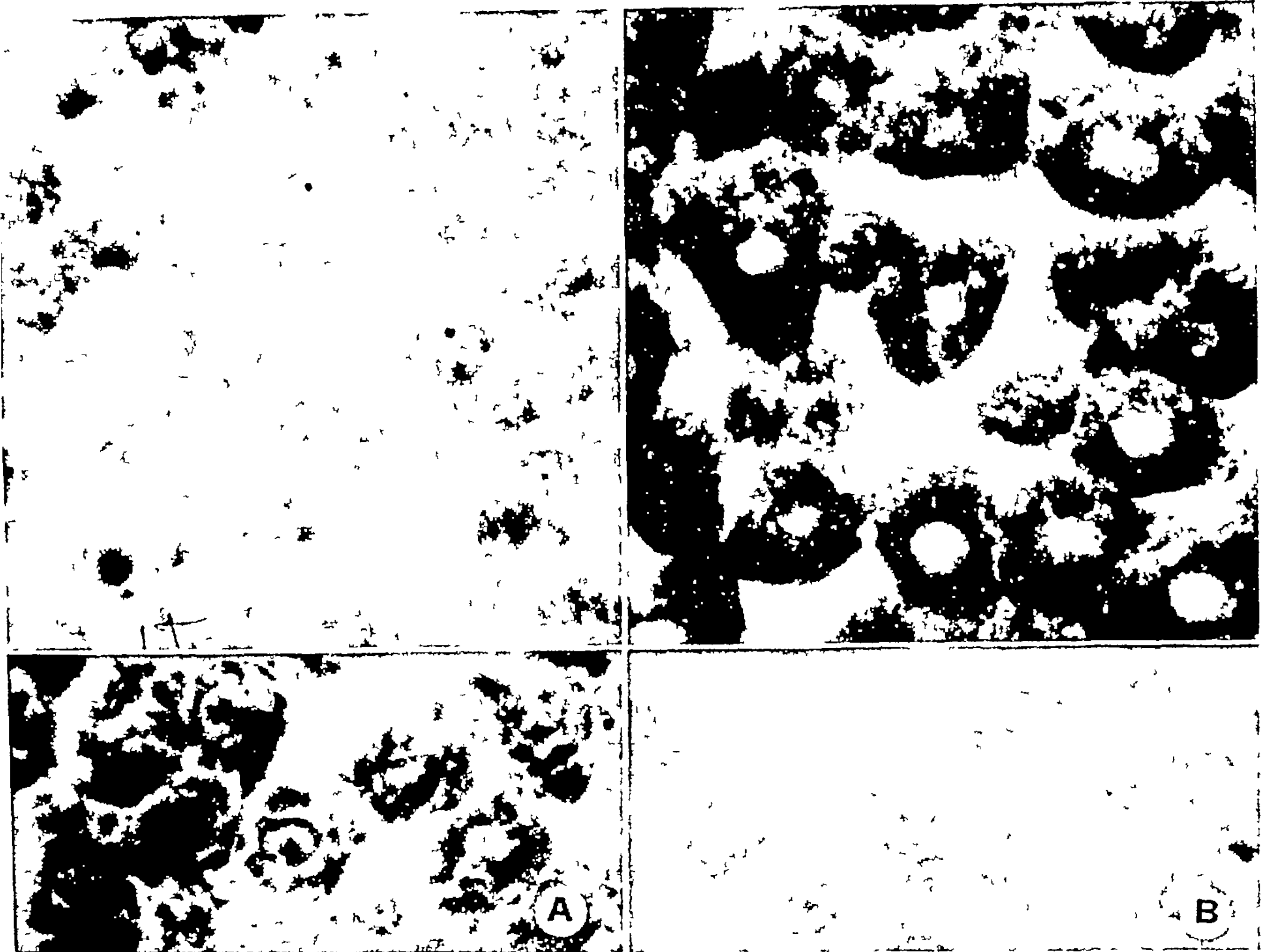


Fig 44 (upper left) Necrosis Hematoxylin and eosin stain (× 1000)
Fig 45 (upper right) Burned rat treated with Ringer solution The liver cells are stored with glycogen Periodic-acid Schiff stain (× 1000)
Fig 46 (lower) A RNA Stained by Toluidine blue (× 1000) B Control

to the increase in globulins and may be correlated to the rapid disappearance of liver glycogen in untreated burns and the storage of it in treated ones

Summary

A short preliminary report is given on some cytological changes in the liver and serum electrophoresis in severe experimental burns in rats Zonal, central necrosis, nuclear pyknosis and vacuoles in the cytoplasm, and some histochemical changes can be shown in the liver cells twenty-four hours postburn These changes are less obvious in burned animals treated with Ringer solution

Serum patterns obtained with paper electrophoresis show a decline in albumin-globulin ratio and mucoproteins and glycoproteins are increased and separated into three high peaks in the burned animals compared with two high peaks in the normal animals

References

1 Bardeen, C R Johns Hopkins Hosp Rep, 7 137, 1898
2 Ellenberg Am J Med, 11 170, 1951
3 Gillman, J, and Gillman, T S Afr J Med Sci, 13 169, 1948
4 Hartman, F W, and Romence, H L Ann Surg, 118 402, 1943
5 James, G W, Purnell, O J, and Evans, E I J Clin Invest, 30 191, 1951
6 Korw, E, and Gronwall, A Scand J Lab Clin Inv, 4 244, 1952
7 Lee, M O Am J Physiol, 89 24, 1929
8 Lee, W E, and Rhoads, J E J Am M Ass, 125 610, 1944
9 Murakami, T Jap J Dermat & Urol, 34 85, 1933
10 Prendergast, J J, Fenichel, R L, and Daly, B M A M A Arch Surg, 64 733, 1952



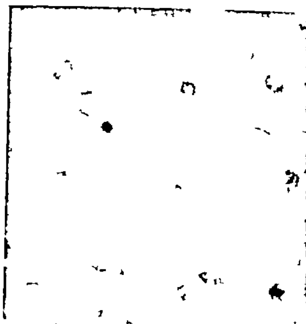




Fig 40 (upper) Capillary stasis [conglomerates of red blood cells] Hematoxylin and eosin stain (× 1000)

Fig 41 (lower) A Burned untreated animal The affected nuclei are swollen and hydropic their outlines being clinging to the nuclear membrane B Control. Hematoxylin and eosin stain (× 1000)

Fig 42. (upper) Fat-free and glycogen free vacuoles in the cytoplasm. Hematoxylin and eosin stain (× 1000)

Fig 43. (lower) A Pyknosis Cytoplasm stains poorly B Control. Hematoxylin and eosin stain. (× 1000)

nucleic acids are changed In Toluidine blue stain RNA shows increased coloration with thin plates in the cytoplasm (Fig 46)

Serum patterns obtained with paper electrophoresis are shown in Fig 47 The paper strips are from above proteins stained by Bromophenol Blue lipids stained by Sudan Black B and mucoproteins and glycoproteins stained in Periodic Acid (Koiw and Gronwall) The albumins are decreased and the globulins are increased in the burned rats but not so much in the treated animals as in the untreated. After three weeks there will be an increase of the gamma globulins The lipids are decreased in Group II and increased in Group III The mucoproteins and glycoproteins are increased and separated into three high peaks in burned animals compared with two high peaks in the normal animals The middle additional peak corresponds

Reporte Preliminar de Algunos Efectos de Quemaduras Experimentales Severas en la Citología Hepática y en el Patron de Electroforesis del Suero. Gosta Arturson

Se presenta reporte preliminar corto de algunos cambios citológicos en el hígado y en la electroforesis del suero en quemaduras experimentales severas en ratas En las células hepáticas se pueden demostrar necrosis de zona y central, picnosis nuclear, vacuolas en el citoplasma y algunos cambios histoquímicos 24 horas despues de la quemadura Estos cambios son menos notables en los animales quemados tratados con solución de Ringer

Las muestras de suero obtenidas con papel de electroforesis muestran un descenso en la proporción albúmino-globulinas Las mucoproteinas y las glicoproteinas están aumentadas y separadas en tres altas cumbres en el animal quemado, en comparacion con las dos cumbres altas de los animales normales

---

Capillary Permeability in Thermal Trauma.

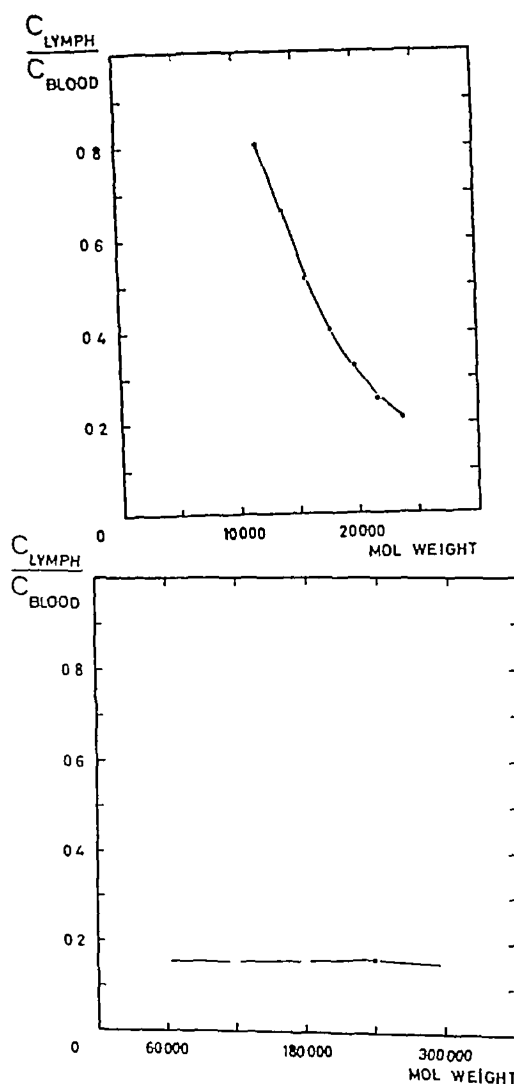
Gunnar Grotte, M D, *Department of Clinical Chemistry and the Institute of Physiology, University of Uppsala, Sweden*

Studies on capillary permeability have been carried out by comparing concentrations of proteins in lymph to that of plasma [1-6] An increase of the protein concentration of lymph, becoming closer to that of blood, has been the criterion of increased capillary permeability However, in conditions of shock, such as following adrenalectomy [3] and severe burns, the protein concentration of lymph may be greatly increased due to the more rapid net movement of water from the extravascular compartment to the circulating blood, capillary permeability per se, i e the structure of the capillary wall, being unchanged The maintenance of a normal capillary pressure during experiments of this kind thus becomes an important condition

To measure changes in permeability of the capillary membrane we have used as test substance a polymer, dextran, with such a distribution of molecular sizes that some molecules pass even through the smaller capillary pores, normally retaining the albumin molecule Changes in permeability are registered by changes of the molecular distribution curves of the lymph samples A short description of the technique will be given (cf [7]) Polymer dextran of a wide distribution of molecular sizes is injected intravenously into nembutalized dogs with occluded renal circulation After about five hours we have a "steady-state" in the various body fluids We then cannulate lymphatics in the legs of the dog and compare the distribution of molecular sizes of lymph to that of plasma

If a molecule passes the capillary wall without hindrance, it will attain the same concentration in lymph as in plasma The concentration ratio will then be 1 If there is a hindrance to a molecule relative to water, ratios lower than 1 will be obtained By estimating these ratios for dextran molecules of known size and radius, we have a measure of the ultramicroscopic pores, according to current theories situated between the endothelial cells, comprising the capillary membrane

Figures 48 and 49 show our results As pointed out above molecules of the ratio 1 pass the capillary membrane without hindrance and



Figs 48 (upper) and 49 (lower) "Steady-state" concentration ratios of dextran molecules across the blood-lymph barrier (Average of 95 cap)

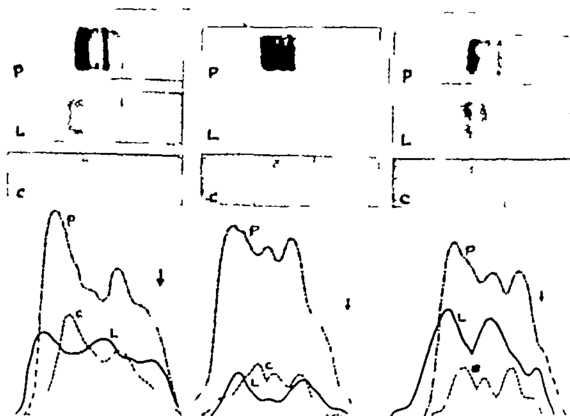


FIG 47 Paper strips and densitometer curves
A (left) Control
P = proteins, L = lipids C = carbohydrates
B (center) Burned without treatment
C (right) Burned treated with Ringer solution
For further description see text.

11 Shedlovsky T and Scudder J J Exper Med., 75 119 1942
12 Wells, D B Humphrey H D and Coll J J N England J M 226 629 1942.
13 Wilson, W C MacGregor A R and Stewart, C P Brit J Surg 25 826 1938

Un Rapport Préliminaire sur Quelques Éffets des Brûlures Experimentales Graves sur la Cytologie Hépatique et sur la Courbe D Électrophorèse du Sérum GÖSTA ARTURSON

Bref compte-rendu préliminaire sur quelques modifications cytologiques du foie et de l électrophorèse du sérum dans les brûlures expérimentales graves chez le rat Les cellules hépatiques peuvent présenter 24 heures après la brûlure des modifications consistant en nécrose zonale ou centrale pycnose nucléaire et vacuole cytoplasmique ainsi que quelques modifications histo-chimiques Ces modifications sont moins nettes quand les animaux ont été traités par la solution de Ringer

Les courbes sériques *obtenues par l électrophorèse* sur papier montrent une baisse du rapport albumine/globuline alors que les mucoprotéines et les glycoprotéines augmentent et trois sommets élevés peuvent être notés sur les courbes des animaux brûlés alors qu il n y en a que 2 chez les animaux normaux

Ein Vorläufiger Bericht über Einige Wirkungen auf die Zellen und die Serum Elektrophorese in der Leber bei Schweren Experimentellen Verbrennungen. GÖSTA ARTURSON

Es wird ein kurzer vorläufiger Bericht über einige Zellveränderungen der Leber und der Serum-Elektrophorese bei schweren experimentellen Verbrennungen bei Ratten vorgelegt. Regionare zentrale Nekrosen Kernpyknose und Vacuolen im Cytoplasma wie auch histo-chemische Veränderungen können 24 Stunden nach der Verbrennung in den Leberzellen nachgewiesen werden Diese Veränderungen sind an Tieren die mit Ringerlösung vorbehandelt wurden, weniger auffallend.

Die mit der Papier Elektrophorese untersuchten Serumverhältnisse lassen eine Abnahme der Albumin-Globulinrate erkennen während Mucoproteine und Glykoproteine vermehrt sind. Bei verbrannten Tieren ergeben sich 3 Maximalwerte gegenüber 2 Maximalwerten bei normalen Tieren.

2 The data may be explained by two different pore systems (a) Capillary pores of a fairly large number and of a magnitude of about 35 Å radius (b) Capillary "leaks," few in number and giving no restriction to globulins or dextran molecules of up to 300 000 mol weight during normal flow

3 Following graded thermal trauma a gradual increase of capillary permeability has been found

REFERENCES

1 Field M E Drinker C K, and White J C Lymph pressures in sterile inflammation J Exper Med 56 363, 1932
2 Drinker C K and Yoffey, J M Lymphatics, lymph and lymphoid tissue Harvard Univ Press, 1941
3 Perlmann, G E, Glenn, W W L and Kaufman, D Changes in the electrophoretic pattern in lymph and serum in experimental burns J Clin Investigation, 22 627, 1943
4 Cope, O Brenizer A G, and Polderman, H Capillary permeability and the adrenal cortex Studies of cervical lymph in the adrenalectomized dog Am J Physiol, 140 1, 1943
5 Cope O, and Moore F D A study of capillary permeability in experimental burns and burn shock using radioactive dyes in blood and lymph J Clin Investigation, 23 241, 1944
6 Cope, O Graham, J B, Moore, F D, and Ball, M R The nature of the shift of plasma protein to the extravascular space following thermal trauma Ann Surg, 128 1041, 1948
7 Grotte, G Passage of dextran molecules of varying sizes from blood to lymph Scand J Cli Lab Inv, 7 59, 1955
8 Cope, O, Graham, J B, Mixter, G, and Ball, M R Threshold of thermal trauma and influence of adrenal cortical and posterior pituitary extracts on the capillary and chemical changes Arch Surg, 59 1015, 1949
9 Wunderly, Ch, and Wuhrmann, F Kapillarpermeabilitat und Bluteiweisstoffe Plasma N 1, 1955
10 Pappenheimer, J R, Renkin, E M, and Borrero, L M Filtration, diffusion and molecular sieving through peripheral capillary membranes Am J Physiol, 167 13, 1951
11 Renkin, E M Filtration, diffusion and molecular sieving through porous cellulose membranes J Gen Physiol, 38 225, 1954

La Perméabilité Capillaire Dans les Brûlures Thermiques. GUNNAR GROTTE

1 On a étudié le mouvement des molécules de dextran insolubles dans les lipides à travers la barrière sang-lymphe de la patte du chien

2 Les résultats obtenus peuvent être expliqués par l'existence de deux systèmes poreux différents

(a) Des pores capillaires en nombre assez élevé et d'un rayon d'environ 35 Å

(b) Des "failles" capillaires en petit nombre et ne gênant pas les molécules de globulines et de dextran jusqu'à un point moléculaire de 300 000 au cours d'une circulation normale

3 A la suite d'une brûlure thermique graduelle on note une augmentation graduelle de la perméabilité capillaire

Kapillardurchlässigkeit bei Hitzetrauma. GUNNAR GROTTE

1 Die Bewegungen von Lipoid-unloslichen Dextranmolekulen uber die Bluthymphbarriere am Bein eines Hundes wurde studiert

2 Die Ergebnisse konnen durch 2 verschiedene Porensysteme erklart werden

(a) Kapillar-Undichtigkeiten von geringer Anzahl, die Globulin- oder Dextranmolekule bis zu 3000 000 mol Gewicht wahrend des normalen Blutflusses nicht zuruckhalten

3 Im Gefolge von verschieden dosierten Warmetraumen wurde ein allmahliches Zunehmen der Kapillardurchlassigkeit gefunden

---

Red Cell Destruction in Burns.

LARS TROELL, M D, *Karolinska Sjukhuset, Stockholm, Sweden*

Severe third degree burns are frequently associated with very pronounced post-traumatic anemia This latter is due to a number of different factors, the respective importance of which has not been fully elucidated

Contributory causes of the anemia are (1) acute hemolysis of red cell corpuscles caused by the thermal trauma, (2) continuous bleeding from infected granulating wounds and blood loss at operations and dressings, (3) depressed bone marrow activity

Sjostrand has shown that the physiologic breakdown of hemoglobin is attended by endogenous formation of carbon monoxide The value for the COHb concentration can be used as a relative measure of the breakdown of hemoglobin By serial determinations of the COHb and the amount of total hemoglobin ad modum Sjostrand the breakdown of red cells has been studied as well as the fate of the transfused blood

Eight patients have been investigated A total of 53 liters of blood, the equivalent of about 6,000 g hemoglobin has been given Calculated

it is seen that the ratio 1 is obtained for dextran molecules up to a molecular weight of about 6 000 a molecular size comparable to that of inulin. From then on however an increasing restriction is shown with increasing molecular weights and from about 20.000 mw the restriction is nearly complete The dextran molecule of 20 000 mw is comparable in size to that of albumin Figure 49 shows how for larger molecules from 60.000 up to 300.000 mw the ratios are the same and quite low These findings can only be explained by two different pore systems (1) Capillary pores of a fairly large number and with a radius of about 35 Å (Ang trom units) (2) Capillary leak " few in number and according to recent experiments (by the author unpublished) of a magnitude of more than 500 Å radius allowing all the plasma proteins to pass freely into the extravascular space

From studies on proteins in blood and lymph it has been pointed out that the passage of globulins through capillary walls is more restricted than that of albumin [2, 3, 4, 5] The finding just mentioned of leaks of more than 500 Å radius makes passage of proteins in bulk" more probable which also has been confirmed by electrophoretic measurements (to be published) In other words albumin and globulin pass with the same ease through the normal capillary membranes in skin and muscle of the dog

Pappenheimer et al [10] have recently formed a simple theory for the passage of molecules through capillary walls saying that this passage is a function of the size of the passing molecule the size of the pores and the velocity of the flow through the membrane Following Pappenheimer s equation, somewhat modified by Renkin,[11] theoretical curves have been drawn for the passage of lipid insoluble molecules of various sizes through capillary walls when isoporosity is assumed (see Fig 50) Theoretical lines are drawn for membrane pores of radius 30 35 and 40 Å As seen here our experimental data suggest an approximate pore radius of 35 Å

We have now studied how this normal capillary barrier is broken up by a graded thermal trauma, induced by dipping the dog s leg in water of 65 75 and 90 C for ten seconds At 65 C for ten seconds we find no difference but at 75 and 90 C there is an increasing effect. The pores of 35 Å radius are broken up

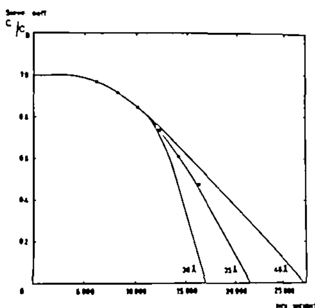


Fig 50 Showing "steady-state" lymph-plasma ratios for dextran molecules compared to theoretical lines for different membrane pore sizes according to the theory of Pappenheimer

making it possible for larger and larger molecules to penetrate more and more freely For the larger (cf Fig 49) molecules passing only *through the leaks" there will* be an increase of the ratios becoming closer to 1 indicating an increasing number of "leaks" (See Fig 51)

SUMMARY

1 The movement of lipid-insoluble dextran molecules across the blood-lymph barrier of the leg of the dog has been studied.

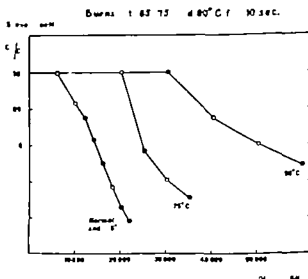


Fig 51 Showing the change of dextran lymph-plasma ratios due to thermal trauma (Three exp at each temp)

formación endógena de monóxido de carbono El valor de la concentración de la carboxihemoglobina puede usarse como una medida relativa del descenso de hemoglobina Por determinaciones seriadas de carboxihemoglobina y la cantidad de hemoglobina total a la manera de Sjostrand, el descenso de eritrocitos en quemaduras graves de tercer grado ha sido estudiado así como el destino de la sangre transfundida.

Las investigaciones fueron conducidas en 8 pacientes Las concentraciones de carboxihemoglobina tuvieron una elevacion substancial en todos los casos (aproximadamente al doble, pero en muchos casos se obtuvieron valores hasta de tres veces el normal

Este aumento indica una elevación en la destrucción de erotrocitos no solo durante los primeros dias desp es de la quemadura sino aun durante la convalescencia en ocasiones durante varios meses

La pérdida diaria de hemoglobina ascendio en estos pacientes a 15.2 gramos La pérdida diaria calculada de acuerdo con el descenso normal equivale a 3 5 gramos asumiendo que la vida normal de los erotrocitos es de 120 dias

Los claculos indican que por lo menos 50% de la pérdida diaria de hemoglobina se debe a destrucción de eritrocitos La investigación mostró que la sangre transfundida era con frecuencia insuficiente, la cantidad requerida se estima mas eficazmente por determinaciones seriadas de la hemoglobina total

---

The Adrenocortical Function in Burns.

Gunnar Birke, M D, and Lars-Olof Plantin *Karolinska Sjukhuset, Stockholm, Sweden*

The combatting of acute shock and the problem of subsequently maintaining a satisfactory nitrogen and protein balance are extremely important considerations in the treatment of acute burns In each instance the adrenal cortex undoubtedly plays a very prominent rôle For the purpose of studying the adrenal function we determined at frequent intervals the urinary output of corticosteroids and 17-ketosteroids in 21 cases, usually up to two months after the burns were sustained In the majority of our cases we chromatographed the ketosteroids and corticosteroids for identification by infrared spectrography in order to observe the steroid pattern both in the acute stage and later on

These two type cases show that in the acute stage the adrenals are in a highly active phase, high steroid excretion, see Table 1, as in other states of stress. With the guidance of earlier metabolic studies we can estimate that during the first 24 hours the adrenals produce at least 100 mg steroids This brings a few therapeutic considerations into the foreground Should ACTH or cortisol be administered if these patients show signs of succumbing to the acute shock? ACTH cannot be expected to have any effect, since the adrenals are already in a state of maximal stimulation If cortisol is to be administered, it must under no circumstances be in small doses Our investigation shows that more than 100 mg of active adrenocortical steroid must be given per 24 hours if these patients are to receive more active steroid than is already produced by their own adrenals In burns of second degree involvement of 10-15 per cent of the body surface represents the limit if a marked adrenal response is to be obtained We found the adrenal activity to be abnormally low between about 10 and 30 days after the initial injury (low steroid excretion, see Table 1), and we observed the same thing in cases with retarded healing up to 7 months after the acute burns This low adrenal activity also calls for therapeutic consideration At this time there is no marked negative nitrogen balance The adrenals also produce steroids having an anabolic effect with respect to nitrogen and proteins, and therefore a detailed study of this problem has been embarked upon In this stage, however, the low steroid production of the adrenals can be stimulated by ACTH, as we have observed also

TABLE 1

Days after initial trauma	Case H V 30 per cent burns		Case G A 4 per cent third degree burns	
	17 KS mg/24 hrs	Corticosteriods mg/24 hrs	17-KS mg/24 hrs	Corticosteriods mg/24 hrs
1	23 5	23 1	19 8	15.2
2	24 7	20 0	8 8	23 9
4	7 1	12 8	5 7	23 6
11	3 2	5 0	6 9	6 5
17	2.2	5 6	4 4	4.2
40	7 3	8 9	7 4	6 9

per patient per day an average of 12 1 g hemoglobin was administered

The daily average loss of hemoglobin in these patients had been calculated at 15.2 g. This value represents the mean value for all patients calculated from each individual case

The COHb concentrations were substantially elevated in all cases on the average they were doubled, but in several cases values two-and-a half to three times the normal were obtained

This increase indicates an increased red cell destruction not only during the first few days after the burn, but also later during the convalescent phase sometimes for several months

As previously mentioned the daily loss of hemoglobin *amounted to 15.2 g in these patients* The calculated daily loss according to normal breakdown amounts to 3.5 g on the assumption that the normal life span of red cells is 120 days

The COHb values not corrected for increased ventilation indicate a breakdown double the normal one, i.e 7.0 g of hemoglobin per day The remaining loss 8.2 g can be referred to losses during dressings and operations, provided that hemoglobin synthesis is completely inhibited. Should this not be the case the loss through direct bleeding must be larger

Thus the calculations indicate that at least 50 per cent of the daily hemoglobin loss is due to red cell destruction. The investigation also shows that the amounts of transfused blood were insufficient in many cases The quantities required are best estimated by serial determinations of total hemoglobin

A more complete report of this investigation was published by L Troell O Norlander and B Johanson Acta Chirurgica Scandinavica vol 109 1955 p 1

La Destruction des Globules Rouges Dans les Brûlures. LARS TROELL

T Sjöstrand a montré que l abaissement physiologique de l'hémoglobine est conditionné par la formation endogène d oxyde de carbone On peut utiliser le taux de concentration du COHb pour mesurer la baisse relative de l'hémoglobine On a apprécié la baisse des globules rouges dans les brûlures graves du 3e degré ainsi que le sort du sang transfusé par des dosages en série du COHb et de l'hémoglobine totale selon la méthode de Sjöstrand.

Les recherches ont porté sur 8 malades. Le taux de concentration de COHb était nettement élevé dans tous les cas d'une façon *générale elles étaient* du double du taux normal et dans de nombreux cas elles représentaient 2 fois et demi à 3 fois ce taux.

Cette augmentation indique une destruction accrue des globules rouges non seulement au cours des quelques premiers jours qui suivent la brûlure mais encore plus tard au cours de la convalescence et quelquefois plusieurs mois après.

La perte d'hémoglobine quotidienne s est élevée à 15,2 g. chez ces malades La perte quotidienne calculée compte tenu de la destruction normale est de 3,5 g en supposant que la durée de vie des globules rouges est de 120 jours

Le calcul indique qu au moins 50% de la perte quotidienne d'hémoglobine est due à la destruction des globules rouges Les recherches ont montré également que les quantités de sang transfusé ont été insuffisantes dans de nombreux cas. On peut mieux apprécier les quantités nécessaires par des dosages en série de l'hémoglobine totale.

Zerstörung roter Blutkörperchen bei Verbrennungen LARS TROELL

T Sjöstrand hat gezeigt daß der physiologische Abbau von Haemoglobin mit endogener Bildung von Kohlenmonoxyd einhergeht Der Wert der COHb Konzentration kann als ein relatives Maß für den Abbau von Haemoglobin genommen werden. In Serienbestimmungen des COHb und der Menge des gesamten Haemoglobin nach der Sjostrandmethode wurde der Abbau roter Blutzellen bei schweren dritt gradigen Verbrennungen studiert, ebenso wie das Schicksal des transfundierten Blutes

Acht Patienten wurden untersucht Die COHb Konzentration war in *allen Fällen beträchtlich* erhöht. Im Durchschnitt war sie verdoppelt, aber in einigen Fällen war der Wert zweieinhalb-bis dreimal so groß wie die Norm

Diese Erhöhung bedeutet eine Vermehrung der Zerstörung der roten Zellen nicht nur während der ersten Tage nach der Verbrennung sondern auch später während der Rekonvaleszenz, manchmal während mehrerer Monate

Der tägliche Verlust von Haemoglobin betrug bei diesen Patienten 15,2 Gramm Der berechnete tägliche Verlust bei normalem Abbau beträgt 3.5 Gramm auf Grund der Annahme daß die normale Lebensdauer der roten Zellen 120 Tage beträgt

Die Berechnungen legen nahe daß mindestens 50% des täglichen Haemoglobinverlustes auf rote Blutzellenzerstörung zurückzuführen ist. Die Untersuchungen zeigten ebenfalls daß die Mengen des transfundierten Blutes in vielen Fällen unzureichend ist. Die benötigten Mengen werden am besten auf Grund von Serienbestimmungen des Gesamthaemoglobins geschätzt

Destrucción de Eritrocitos en las Quemaduras. LARS TROELL.

T Sjöstrand ha demostrado que el descenso fisiológico de la hemoglobina se acompaña por

allen schwer erkrankten Patienten merklich an, fiel dann ziemlich schnell und erreichte nach etwa 10 Tagen subnormale Werte Jedoch kam es bei uberlebenden Patienten durch ein allmahliches Wiederansteigen innerhalb von acht Wochen wieder zu, dem Alter und dem Geschlecht entsprechenden, Normalwerten

Das Verhalten der 17-Ketosteroide war unmittelbar nach der Verbrennung deutlich verandert In zwei todlich verlaufenden Fallen war die gesamte 17-Ketosteroid-Ausscheidung niedrig mit einem pathologischen Verhalten des Steroids und einem ausgesprochenen Ansteigen der gesamten Corticosteroidausscheidung unmittelbar vor dem Tode Zu diesem Zeitpunkt wurde auch ein Corticosteroid aufgefunden, das gewohnlich nicht in irgendwelchen grosseren Mengen bei gesunden Personen vorhanden ist Alle diese Beobachtungen deuten darauf hin, dass die Nebennieren bei den verschiedenen Phasen der Verbrennung eine wichtige Rolle spielen

La Función de la Corteza Suprarrenal en las Quemaduras. Gunnar Birke y Lars-Olof Plantin

En una serie 21 casos de quemaduras los autores intentaron estudiar la función de las cápsulas suprarrenales Se observó por períodos diversos la excresión urinaria de 17-quetosteroides y corticosteroides, como regla por dos meses despues de haber recibido a los pacientes Se estudiaron tambien individualmente los 17-quetosteroides y corticosteroides Inmediatamente despues de la lesión, la excresión total de 17-quetosteroides y corticosteroides sube de modo marcado en todos los pacientes quemados severamente, despues baja rápidamente y cerca de 10 dias despues tiene niveles sub-normales Un ascenso subsecuente gradual, sin embargo, lleva las lecturas en pacientes que se recobran a lo normal por la edad y sexo de cuatro a ocho semanas despues de la quemadura La muestra de 17-quetosteroides estaba alterada directamente despues de la quemadura En dos casos que terminaron con la muerte la excresión de 17-quetosteroides era baja con una muestra de esteroide patológico y un pronunciado ascenso de la excresión total de corticosteroides inmediatamente antes de la muerte En este momento tambien se identificó un corticosteroide que no se encuentra presente en personas con salud Todas estas observaciones indican que la corteza suprarrenal juega un papel importante en las diversas fases de las quemaduras

---

The Problem of Septicemia in Burns. Curtis P Artz, Lieutenant Colonel, M C, Harry S Soroff, Captain, M C, Robert D Pillsbury, Lieutenant Colonel, M C, and Robert P Hummel, 1st Lieutenant, M C, *Surgical Research Unit, BAMC, Fort Sam Houston, Texas, U S A*

In a previous presentation from the Surgical Research Unit, it was pointed out that septicemia was a common cause of death in extensive burns[1] At that time, 35 deaths following burns were reported from August 1950 to January 1954 Twelve of these patients' deaths were associated with septicemia, and in four additional patients septicemia was strongly suspected

The purpose of this presentation is to review further experiences with septicemia Including the previous series there were 61 deaths in the management of more than 800 hospitalized burned patients between August 1950 and July 1955 Septicemia was associated with 31 of these deaths The mean extent of burn of the septicemia fatalities was 56±3 per cent total (38±3 per cent third degree) There were 14 fatalities during this period associated with fluid and electrolyte imbalance Both the total extent of burn, 71±7 per cent, and the extent of third degree involvement, 58±7 per cent, were significantly larger than in the septicemia group The survival time of the fluid imbalance group was significantly shorter, 4±1 days (Table 1) It would appear that the extensively burned patient who survives the initial threat of fluid and electrolyte imbalance then experiences the threat of infection, or probably more specifically of septicemia

Many deaths in young infants and elderly individuals from a variety of causes (Table 1) However, deaths in the young previously healthy individuals seem to be caused primarily by fluid derangements early in the postburn course and later by the insults of infection

Deaths Associated with Septicemia

Table 2 summarizes the pertinent data of 31 burned patients in whom septicemia was associated with death The average age was 28 years Although local care in many of these patients was accomplished by a combination of occlusive dressings and by the exposure method, the primary method of local care was exposure in 19 patients and dressings in 12 The average per cent of burn in the exposed group was 56±4 per cent and in the dressed group 58±4 per cent (Table 3) The average time of onset of septi-

in cases with severe inanition. Even cases that later recover show an appreciably disturbed steroid pattern during the acute phase. There is a pronounced elevation of a 17 ketosteroid, dehydroepiandrosterone, but no rise in the breakdown products of hydrocortisone to 17 ketosteroids. This is highly remarkable because stimulation with ACTH is not associated with such a rise of dehydroepiandrosterone but does cause an elevation of the breakdown products of hydrocortisone. Since therefore the steroid pattern is so markedly changed, either the adrenal production or the metabolism in the body is greatly disturbed in acute stress of this type. Three of the 21 patients died 2, 12 and 23 days respectively after the initial trauma.

Table 2 shows here some of the values for the total excretion of 17 ketosteroids and corticosteroids in the two patients who lived longest. It is striking that the rise in both keto- and corticosteroids remained within moderate limits initially and that no elevation of dehydroepiandrosterone was present in the acute stage. The marked and rapid reduction of the 17 ketosteroids is also noteworthy. Remarkable too is that we instead found an appreciable increase in the corticosteroids immediately before death, when the 17 ketosteroid values were low. Detailed analysis of the corticosteroids in these cases showed, besides the common principal metabolites (tetrahydrocortisol and tetrahydrocortisone) appreciable amounts of cortisol which is not found in any major quantities in ordinary cases.

All of these findings point to a disturbed steroid production or metabolism in the acute phase of severe burn, and this metabolism is even more markedly changed in cases that prove fatal. Further investigations are therefore required in order to throw further light clinically and theoretically on this important problem.

La Fonction Cortico-Surrenalienne Dans les Brûlures. GUNNAR BIRKE ET LARS-OLOF PLANTIN

Dans une série de 21 cas, nous nous sommes efforcés d'étudier la fonction des surrénales. L'excrétion urinaire des 17-cétostéroïdes et des corticostéroïdes a été suivie pendant des périodes variables et en règle pendant 2 mois après la brûlure. On a également étudié les 17-cétostéroïdes et les corticostéroïdes pris isolément. Immédiatement après le traumatisme l'excrétion totale des 17-cétostéroïdes et de corticostéroïdes s'est accrue de façon notoire chez tous les malades gravement brûlés pour baisser ensuite d'une façon relativement rapide et atteindre au bout de dix jours des taux subnormaux. Une augmentation graduelle ultérieure a cependant fait remonter les chiffres chez les malades guéris à des taux normaux pour leur âge et leur sexe et cela environ quatre à huit semaines après la brûlure. La courbe des 17-cétostéroïdes a été troublée de façon notoire immédiatement après les brûlures. Dans 2 cas à issue fatale l'excrétion des 17-cétostéroïdes totaux a été basse avec un tracé pathologique des stéroïdes et une augmentation accentuée de l'excrétion des 17-cétostéroïdes totaux immédiatement avant la mort. A ce moment également on a pu identifier un corticostéroïde qu'on ne trouve pas habituellement de façon notoire chez des sujets bien portants. Il résulte de ces observations que le cortex surrénalien joue un rôle important dans les différentes phases des brûlures.

Die Adrenocorticale Funktion bei Verbrennungen. GUNNAR BIRKE UND LARS-OLOF PLANTIN

In einer Serie von 21 Verbrennungsfällen haben wir versucht, die Funktion der Nebennieren zu studieren. Die Ausscheidung von 17 Ketosteroiden und Corticosteroiden im Urin wurden über verschiedene Zeitperioden hin beobachtet, in der Regel zwei Monate lang nach Stattfinden der Verbrennung. Die einzelnen 17 Ketosteroide und Corticosteroide wurden ebenfalls studiert. Unmittelbar nach dem Trauma stieg die Gesamtexkretion der 17 Ketosteroide und Corticosteroide bei

TABLE 2

Days after initial trauma	Case V H, 34 per cent burns		Case O T, 40 per cent burns	
	17 KS mg/24 hrs	Corticosteroids mg/24 hrs	17 KS mg/24 hrs	Corticosteroids mg/24 hrs
1	9.0	10.3	10.8	22.0
4	10.2	—	7.8	10.2
5	10.5	—	—	—
9	1.5	7.9	4.3	33.1
13	1.7	9.7	—	—
16	1.0	10.4	—	—
21	3.7	19.5	—	—

Table 2 Pertinent Data on 31 Deaths Associated with Septicemia

(August 1950 through June 1955)

No	Patient and year admitted	Age	Local care	Per cent of surface burned: Total	Per cent of surface burned: 3°	Day of onset	Number of postburn days until death	Condition of wound at onset	Causative organism (sens)	Similar organism in wound	Antibiotic therapy	Remarks
1	J.F D 1950	27	E	60	50	11	22	Intact eschar	no data *	no data	S	Post-mortem abcesses of the brain, lung and kidneys
2	G W 1951	8	E	60	60	21	31	Slough	*M pyogenes* C,N	yes	P,S,C T	Large doses of ACTH, focal myocarditis
3	C T 1951	22	E	55	50	2	3	Intact eschar	Paracolon	no	P	
4	J D.H 1951	21	D	45	36	37	63	Granulating surface	no data *	no data	T,C	Very septic course, dirty wounds
5	T J.B 1951	26	E	85	70	15	18	Slough	*M pyogenes* C,B,N	yes	P,S,C	T-107[2], septic emboli in lungs
6	M A 1952	26	E	57	56	5	11	Eschar excised	no data *	no data	no data	Toxic course, poor granulations
7	J G 1952	26	D	60	60	19	29	Slough	no data *	no data	P,T	T-105[2], very toxic, dirty wounds
8	C W 1952	65	D	65	40	4	6	Intact eschar	Paracolon	no	P	Acute endocarditis, pyelonephritis
9	A M 1953	21	D	69	35	4	6	Intact eschar	Pseudomonas	yes	P,S	
10	M V.D 1953	27	E	32	21	11	38	Eschar excised	*M pyogenes* C,M E	yes	C E,B,M	Acute endocarditis, pyelonephritis
11	L.A 1953	33	D	47	27	27	54	Granulating surface	*M pyogenes* C,B,E,N	yes	P,S,C,B	Acute endocarditis, myocarditis
12	J B 1953	17	D	70	60	29	36	Slough	*Pseudomonas* C,Su *Proteus* C,Su	yes	C Su	Acute endocarditis, splenic infarcts, pyelonephritis
13	T H 1953	21	D	72	33	8	11	Slough	*Pseudomonas* T	yes	P,C,T	Very toxic, acute yellow atrophy, bronchopneumonia
14	L C 1953	49	D	40	30	14	22	Slough	*Pseudomonas* T	yes	P,S,Su	T-107, necrotic fat on wound
15	C McD 1953	35	E	45	45	4	8	Intact eschar	Paracolon A,C,T,Px	yes	P,A	

TABLE 1 SUMMARY OF 61 CONSECUTIVE BURN FATALITIES

(August 1950—June 1955)

Cause of death	Number	Age	Per cent		Survival time (days)
			Total	3°	
Septicemia	31	28	50 ± 3	38 ± 3	25 ± 4
			0.05>P>0.02	0.02>P>0.01	P<0.001
Fluid Imbalance	14	25	71 ± 6	58 ± 7	4 ± 1
Acute Pulmonary Damage	4	15	40	20	1
GI Ulceration	2	21	58	22	21
Hepatitis	3	21	28	25	77
Bronchopneumonia	3	15	47	18	0
Congestive Atelectasis	1	23	30	30	61
Cardiac Arrest	1	27	45	40	87
Cerebral Concussion	1	27	80	80	8
Coronary Occlusion	1	77	30	3	8

cemia after injury of all 31 patients was 13±2 days (Table 2) in the exposed group 11 and in the dressed group 16 (Table 3) Thus it would appear that the method of local care had little or no influence on the development and course of septicemia

The time of onset of septicemia might seem to be related to the extent of injury since the mean per cent of burn in those patients who developed this complication during the first 7 days was 63 while the mean per cent of burn of those who developed septicemia after the 7th day was 53 but the difference was not statistically significant

The predominant causative organism in 17 cases was a gram positive coccus (*Micrococcus pyogenes*) and in 10 cases a gram negative rod Data were not available in 4 cases.

In the following statistical analysis, cases 23 and 24 were excluded because their original septicemia was under control and much of the burn had healed, but death eventually occurred from unrecognized abscesses that served as a focus of infection.

The average size of burn in the gram positive was 55±5 total 32±4 third degree in the gram negative series 55±8 total and 43±3 third degree The difference of total extent of burn was not significant between the two groups but the extent of third degree involvement was significantly higher in the gram negative group (Table 4) The average day of onset of septicemia was not significantly different in the gram positive and gram negative groups 13±2 days and 11±3 days respectively (Table 4) The average survival time (day of injury to day of death) of all septicemia patients was 21 days There was an apparent but not significant difference between the mean survival time of those who had gram positive organisms (22 days) and the survival time of the gram negative group (14 days) However there was a significant difference in the survival time after septicemia (day of onset until death) between the gram positive group 9 days and the gram negative group 3 days (Table 5)

There was an apparent but not significant difference in survival time between the patients with gram positive septicemia who had more than 50 per cent (17±3 days) and those who had less than 50 per cent burn (31±5 days) The average survival time of patients in the gram negative group with more than 50 per cent burn was 14±4 days and was not different from those with less than 50 per cent burn 15±7 days.

There was a significant correlation between the number of days from burn to death and total extent of burn that is the more extensive the burn, the less the survival time. There was no significant correlation however between the *number of days from burn to onset of septicemia* and the extent of burn

STATUS OF WOUND AT ONSET OF SEPTICEMIA

In 14 instances the eschar was intact, in 11 the wound was sloughing, in 4 the eschar had been excised and in 2 there was a well established granulating surface at the onset of septicemia (Table 2) Thus septicemia developed in most instances while an eschar was present In the intact eschar group many of the patients had purulent material under the eschar In

TABLE 2—*Continued*

No	Patient and year admitted	Age	Local care	Per cent of surface burned Total	3°	Day of onset	Number of postburn days until death	Condition of wound at onset	Causative organism (sens)	Similar organism in wound	Antibiotic therapy	Remarks
28	J G 1955	34	E	58	36	21	23	Slough	*Pseudomonas* Px	yes	P,T,S,C	Petechiae in brain, large liver and spleen
29	G McD 1955	24	E	56	26	22	34	Intact eschar	*M pyogenes* B	yes	C,E,B	Myocardial and lung abscesses
									Pseudomonas Px			
30	F D 1955	55	E	60	35	6	20	Intact eschar	*M pyogenes* B			Acute endocarditis, myocardial and kidney abscesses
									Paracolon A,C,T,Px	no data	C,E,B	
31	M W R 1955	26	E	90	35	7	10	Intact eschar	*M pyogenes* B	no	C,T,B	Enlarged liver and spleen
Average		28		56 ± 3	38 ± 3	13±2	21					

Abbreviations D, dressing E, exposure sens sensitivity

* In the early part of the study, blood cultures were not drawn, these cases were judged as septicemia on clinical and autopsy findings

Antibiotics

A, aureomycin E, erythromycin P, penicillin Su, sulfadiazine
B, bacitracin M, magnamycin Px, polymyxin B T, terramycin
C, chloromycetin N, neomycin S, streptomycin

TABLE 2—*Continued*

No.	Patient and year admitted	Age	Local care	Per cent of surface burned: Total	Per cent of surface burned: 3	Day of onset	Number of postburn days until death	Condition of wound at onset	Causative organism (sens.)	Similar organism in wound	Antibiotic therapy	Remarks
16	J.L.E 1954	14	E	33	33	12	14	Eschar excised	*M pyogenes* C; *Pseudomonas* C T,Px	yes	T C,Px	Retarded child eschar excised, fat necrotic
17	J.L. 1951	65	E	26	26	23	40	Slough	*M pyogenes* C,B; *Pseudomonas* A C T,Px	yes	T C,E,B	Multiple subcutaneous abscesses
18	J.D 1954	25	E	95	0	6	0	Intact eschar	*M pyogenes* B,E	no	C,B,Px	Abscesses in kidneys
19	L.S 1954	23	E	36	32	9	18	Intact eschar	*M pyogenes* B,E; *Proteus* C; *Pseudomonas*	yes	B,E	Very deep burn muscle necrosis
20	B.A. 1954	23	E	65	15	4	0	Intact eschar	*M pyogenes* B,E; *Pseudomonas* Px	yes	P C,B,E	Very irrational during entire course
21	E.G 1951	20	D	75	50	8	9	Eschar excised	*M pyogenes* B,E	doubtful	C	Massive excision on 3d day necrotic muscle necrotic fat
22	G W 1954	21	E	60	45	21	22	Slough	*Proteus* resistant	no	T,C	Acute pericarditis pancarditis with abscess focal pyelitis
23	C.B 1954	23	D	50	25	20	57	Slough	*M pyogenes* B; Yeast (11)	yes	P,S T C,B E	Septicemia from unrecognized abscess
24	F.L 1954	25	E	30	15	3	103	Intact eschar	*M pyogenes* C,B	yes	P,S,C B,E,N	Initial septicemia cured later septicemia from unrecognized feeding focus
25	C G 1954	20	D	60	45	8	10	Intact eschar	*M pyogenes* B	yes	P C,B,E	Cerebral edema large liver and spleen
26	W.M 1954	36	E	58	58	1	7	Intact eschar	Paracolon C	yes	P T,C,Px	Positive blood culture 12 hours after injury blood pressure 80/40
27	J C 1955	25	D	30	20	15	21	Slough	*M pyogenes* B,N	yes	C,E,B	Myocardial abscesses

TABLE 2—*Continued*

No	Patient and year admitted	Age	Local care	Per cent of surface burned Total	3°	Day of onset	Number of postburn days until death	Condition of wound at onset	Causative organism (sens)	Similar organism in wound	Anti-biotic therapy	Remarks
28	J G 1955	34	E	58	36	21	23	Slough	*Pseudomonas* Px	yes	P,T,S,C	Petechiae in brain; large liver and spleen
29	G McD 1955	24	E	56	26	22	34	Intact eschar	*M pyogenes* B	yes	C,E,B	Myocardial and lung abscesses
									Pseudomonas Px			
30	F D 1955	55	E	60	35	6	20	Intact eschar	*M pyogenes* B			Acute endocarditis, myocardial and kidney abscesses
									Paracolon A,C,T,Px	no data	C,E,B	
31	M W R 1955	26	E	90	35	7	10	Intact eschar	*M pyogenes* B	no	C,T,B	Enlarged liver and spleen
Average		28		56 ± 3	38 ± 3	13±2	21					

Abbreviations D, dressing E, exposure sens sensitivity

* In the early part of the study, blood cultures were not drawn, these cases were judged as septicemia on clinical and autopsy findings

Antibiotics

A, aureomycin E, erythromycin P, penicillin Su, sulfadiazine
B, bacitracin M, magnamycin Px, polymyxin B T, terramycin
C, chloromycetin N, neomycin S, streptomycin

TABLE 3 SEPTICEMIA IN DRESSED AND EXPOSED GROUPS

Category	Number of patients	Average Percent Burn Total	3	Average day of onset
Dressings	12	58 ± 4	39 ± 4	16 ± 3
				N.S.*
Exposure	10	56 ± 4	38 ± 4	11 ± 2

* Not statistically different.

the four patients with excised eschar only few granulations had formed and the fat was necrotic. The two patients who had granulating wounds had markedly purulent surfaces It would appear that the wound surfaces were in such condition that they could well have served as a focus for invasion of bacteria into the blood stream

Organisms judged to be the same because of similar sensitivity patterns were found in the blood and on the wound in one case it was doubtful, and in five cases there were no data. It would appear that the wound was the most likely source of the organisms causing septicemia.

Micrococcus pyogenes coagulase positive was the most common offending agent In the first few years of this study the *Micrococcus pyogenes* was sensitive to chloramphenicol in most instances but during 1954 and 1955 the organisms were resistant to almost all antibiotics except bacitracin. In patient 10 septicemia was caused initially by *M pyogenes* sensitive to chloramphenicol. The patient improved on chloramphenicol therapy but later developed a positive blood culture due to *Micrococcus pyogenes* resistant to chloramphenicol and sensitive only to erythromycin and bacitracin.

It appears that during the past few years, the bacterial flora of patients on the Burn Ward has changed Recently most of the causative *micrococcus pyogenes* organisms have been resistant to almost all antibiotics except bacitracin. This changing sensitivity pattern may have been caused by the increased use of antibiotics other than bacitracin as prophylactic systemic therapy and as local therapy

PATIENTS WHO SURVIVED SEPTICEMIA

Seven burned patients developed septicemia and survived (Table 6) Their average age was 21 The mean total per cent of burn was 41±5 with 20±5 third degree. This was significantly less than the mean of the group that died. The average day of onset of septicemia was 6±1 which is significantly different from the day of onset in the fatalities (13±2 days) (Table 7) Two of the patients had positive blood cultures for weeks (41 and 43 days) whereas the others were cured more rapidly In every case the diagnosis of septicemia was made from the clinical signs and the presence of a positive blood culture. Distinction was made between septicemia and transient bacteremia. Several patients on the Burn Ward had been seen to have a sharp rise in temperature chills and a positive blood culture that disappeared in 24 to 48 hours. These episodes usually followed manipulation of

TABLE 4 COMPARISON OF DATA OF GRAM POSITIVE AND GRAM NEGATIVE FATALITIES

Category	Number of patients	Percentage of surface burned: Total	3	Average day of onset	Burn to death (days)	Septicemia to death (days)
Gram Positive	17	55 ± 5	32 ± 4	13 ± 2	22 ± 3	9 ± 2
			0.05>P>0.02		N.S.*	0.02>P>0.01
Gram Negative	10	56 ± 8	43 ± 3	11 ± 2	14 ± 3	3 ± 1

* Not statistically different.

TABLE 5 SURVIVAL TIMES IN PATIENTS OVER AND UNDER 50 PER CENT BURN

(Gram positive and gram negative groups)

Group	Total series	Gram positive	Gram negative
Over 50 Per Cent	16 ± 7 days	17 ± 8 days	14 ± 4 days
	N.S.*	N.S.	
Under 50 Per Cent	29 ± 5 days	31 ± 6 days	15 ± 7 days

* Not statistically different.

Table 6 Pertinent Data on Septicemia Survivors

(August 1950 through June 1955)

No	Patient and year admitted	Age	Local care	Per cent of surface burned: Total	Per cent of surface burned: 3°	Day of onset	Positive Cultures: Number of days	Positive Cultures: Total number	Condition of wound at onset	Causative organism (sens.)	Therapy: Antibiotic	Therapy: Daily amount	Therapy: Total days	Remarks
1	M.F 1952	27	D	45	40	4	1	1	Suppuration (enzyme)	*M pyogenes* S,A,C,T	T	2.0 gm	—	T-103, abdomen distention, semicomatose, improved after 6 days of therapy
											C	2.0 gm	—	
2	A M 1953	20	D	25	25	4	6	3	Intact eschar	Paracolon A,T	C	0.5 gm	3	T-105, disoriented
											S	1.0 gm	4	
											E	2.0 gm	9	
3	E.B 1953	24	D	40	20	9	3	3	Slough	*M pyogenes* C,N	P	1,800,000	—	T-104, disoriented
											S	2.0 gm	—	
											C	2.0 gm	—	
4	J.B 1954	18	D	33	13	6	10	8	Slough	*M pyogenes* B	P	5,000,000	14	On bacitracin highest NPN, 25, no renal damage
											C	3.0 gm	6	
										Paracolon C,Px	E	2.0 gm	6	
											B	300,000	16	
5	P.B 1954	21	E	37	11	4	7	5	Slough	*M pyogenes* C,B,N	C	3.0 gm	29	Albumin and RBC in urine, highest NPN, 30, during bacitracin, no renal damage
											B	300 000	29	
6	E H 1954	22	E	40	30	4	43	30	Suppuration (enzyme)	*M pyogenes* B,E,N	C	3.0 gm	52	No renal damage
											E	2.0 gm	52	
											B	300 000	52	
											B	100,000	5	
											Px	150 mg	4	
7	H V 1954	21	D	68	43	11	41	15	Slough	*M pyogenes* C,B	C	3.0 gm	12	Albumin and RBC in urine, no renal damage Cadaver homografts used, only one anesthetic, Curling's ulcer with massive hemorrhage
											E	2.0 gm	12	
											B	300,000	12	
											B	75,000	2	
Average		21		41 ± 5	23 ± 5	6 ± 1	16 ± 7							

Abbreviations D, dressing E, exposure sens, sensitivity

Antibiotics A, Aureomycin B, bacitracin C, Chloromycetin E, erythromycin N, neomycin P, penicillin Px, Polymyxin B S, streptomycin T, Terramycin

TABLE 7 COMPARISON OF DATA ON SEPTICEMIA FATALITIES AND SURVIVORS

Category	Age	Percentage of surface burned: Total	Percentage of surface burned: 3°	Onset of septicemia (day)
Fatalities	28	56 ± 3	38 ± 3	13 ± 2
		0.02>P>0.01	0.05>P>0.02	0.01>P>0.001
Survivors	21	41 ± 5	26 ± 5	6 ± 1

the eschar This entity has been classified as a transient bacteremia and must be distinguished from true septicemia in which the patient shows *disorientation paralytic ileus decrease in urinary* sodium, and manifestations of toxicity that persist for several days

In six of the seven patients, the wounds were quite purulent and revealed sloughing eschar In two of the patients (Nos. 1 and 6) septicemia developed shortly after an enzymatic debriding agent had been applied in an attempt to hasten eschar removal (Table 6)

The causative organism in six of the seven patients was *Micrococcus pyogenes* four were sensitive to chloramphenicol and four were also sensitive to bacitracin.

Therapy in this series included massive doses of combinations of antibiotics. Chloramphenicol was given in a daily dose of 2 to 3 grams intravenously There was no evidence of any blood dyscrasia.

Bacitracin, 300,000 units daily was given to four patients for 12 16 29 and 52 days. None of these patients manifested any permanent renal damage Most of the patients showed albumin, red blood cells and some casts in the urine during treatment but the urine cleared shortly after cessation of bacitracin. Nonprotein nitrogen determinations were performed frequently during administration of bacitracin. There were slight elevations occasionally but never above 50 mg per cent

It is difficult to assess the exact role of massive antibiotic therapy in this group of survivors because there was an aggressive attempt to clean and graft the wound during the time of drug administration. It was the clinical impression that these systemic antibiotics prevented the bacteria from causing overwhelming bacterial toxicity and sustained the patient during the period of wound cleansing, debridement, and grafting until the primary focus of the offending microorganism was eliminated

DISCUSSION

As more burned patients survive the immediate postburn period because of improved replacement therapy added emphasis is given to the problem of infection or more specifically to septicemia. Although 31 deaths are listed in Table 1 as being associated with septicemia, not all of these patients died because of septicemia alone. Several patients had very extensive burn injury and bacteria seemed to invade the blood stream shortly before death as an added and final insult It appears that the massive injury is first characterized by destruction of a large volume of tissue and the insult to the body is further compounded by infection. In many patients however the body could withstand the severe insult if generalized blood stream infection could be prevented.

The development of septicemia seems to depend upon several factors (1) volume of tissue destroyed (2) size of bacterial inoculum and (3) resistance of the patient. The size of the bacterial inoculum is not particularly influenced by the method of local care Exposed burns appear clean but many bacteria proliferate beneath the eschar As long as the eschar is present microorganisms that are normally harbored about the hair follicles and in the ducts of sweat glands multiply rapidly This is not surprising since the subcutaneous tissue beneath the burn has a diminished blood supply because of thrombosis that follows the burn injury Bacterial proliferation is further enhanced by the presence of dead burned tissue. The primary problem locally would seem to be directed toward the diminution of the bacterial inoculum which cannot be accomplished until the eschar is removed. After this devitalized tissue has been *removed a healthy granulating surface* must develop in order to serve as a protective barrier against invading microorganisms. From clinical observations it appears that the formation of this barrier is influenced by the extent

of the injury Very extensively burned patients fail to form protective granulations and develop septicemia even after the dead eschar has been excised This failure to form a protective granulating surface may be only a part of the diminution in resistance to infection that is seen in the extensively burned patient This decreased resistance to infection is one of the problems that requires further investigation

The commonly observed clinical picture of septicemia is characterized by high fever tachycardia, tachypnea, disorientation, paralytic ileus, and later hypotension These are also the signs of toxemia Toxemia has remained an obscure entity and has been blamed for many deaths in burns In most instances in this series, there was evidence that these toxins came from bacteria

The most frequent offender in causing septicemia is the *Micrococcus pyogenes* Unfortunately, in this series this organism was resistant to most antibiotics except bacitracin At the present time, it appears that the treatment of septicemia is best accomplished by massive doses of the appropriate antibiotic (as evidenced by the sensitivity studies) and removal of the necrotic tissue in preparation for a granulating protective surface The antibiotic therapy will control blood stream infection for a period of time that will permit treatment of the local surface and elimination of the focus of infection However, this treatment must be of such nature that it does not add further insult to the patient

The experience in cases 4, 5, 6, and 7 (Table 3) with massive doses (300,000 units daily) of bacitracin shows that large doses of this drug may be used without dangerous nephrotoxicity However, careful evaluation of the patient's renal status should be followed daily and the drug discontinued if the nonprotein nitrogen rises above 50 mg per cent

Summary

The causes of death in 61 burn fatalities were reviewed Septicemia was associated with death in 31 cases and fluid and electrolyte imbalance in 14 cases The total extent of burn and extent of third degree burn was significantly greater in the fluid imbalance group The survival time was significantly shorter in this group

Of the 31 septicemia fatalities, exposure was the primary method of local care used in 19 patients, and in 12 patients the wounds were primarily treated with occlusive dressings. There was no significant difference in the size of the burn and the day of onset of septicemia between the dressed and exposed groups

In the 27 patients in whom data were available, there were 17 cases of gram positive septicemia and 10 cases of gram negative septicemia The primary offending organism in all the gram positive septicemias was *Micrococcus pyogenes* Five of the gram negative septicemias were due to *Pseudomonas,* four were due to Paracolon, and one was due to *Proteus* The total extent of burn in these gram positive and gram negative groups was the same, but there was a significantly greater amount of third degree burn in the gram negative group The average postburn day of onset of septicemia and the average survival time were the same in the gram positive and gram negative groups However, there was a significantly shorter survival time after the onset of septicemia in the gram negative group There was no difference in survival time of the fatalities with more than 50 per cent total surface area burned or those less than 50 per cent

The following were the conditions of the wounds at the time of onset of septicemia there was intact eschar in 14 cases, a sloughing eschar in 11 cases, and an excised eschar with necrotic fat in 4 cases, and a purulent granulating surface in 2 cases In 20 of the septicemia fatalities, the same organism that appeared in the blood culture was found on the wound surface

There were seven patients with septicemia who survived Both the total extent of burn and area of third degree involvement in these cases were significantly less than in the group of septicemia fatalities The causative organism in six of these cases was *M pyogenes,* and Paracolon was the causative organism in one case

None of the *M pyogenes* found in the total study was resistant to bacitracin Three-hundred thousand units of bacitracin, 2 0 grams of erythromycin, and 2 0 grams of chloromycetin were given in combination for periods varying from 12 to 52 days in the last four survivors There was no evidence of nephrotoxicity

REFERENCES

1 Liedberg, N C-F., Reiss E., and Artz C P Infection in burns III Septicemia a common cause of death Surg. Gyn Obst 99 151 1954

Le Problème de la Septicemie Dans les Brûlures. CURTIS P ARTZ, HARRY S SOROFF ROBERT D PILLSBURY ET ROBERT P HUMMEL.

La septicémie a été la cause de la mort dans 31 cas sur 61 décès par brûlure alors que le déséquilibre hydrique et électrolytique n a entraîné d issue fatale que dans 14 cas Les données relatives à 27 malades présentant la même surface brûlée font ressortir des septicémies à germe gram positif dans 17 cas et à germe gram négatif dans les 10 autres. Tous les 17 malades étaient infectés par le micrococus pyogenes. Dans 5 cas la septicémie à germe gram négatif a été due au pseudomonas, dans 4 au paracolon et dans 1 au proteus Le début de l'infection et le temps de survie ont en moyenne été les mêmes dans les 2 groupes bien que la mort soit survenue plus tôt après l'installation de la septicémie dans le groupe gram négatif

Etat de la plaie Au moment de l'installation de la septicémie il existait une escharre sèche dans 14 cas, une escharre humide dans 11 une escharre excisée avec graisse nécrotique dans 4 et une surface de granulation purulente dans 2 cas. Le même micro-organisme a été retrouvé à la surface de la plaie que dans l'hémoculture

Survie Sept malades qui avaient présenté de la septicémie survécurent. La surface totale de la brûlure et celle de la zone brûlée au 3e degré était nettement moins importante que chez les malades ayant succombé Le micrococus pyogenes a été l agent causal de la septicémie dans 6 sur 7 de ces cas alors que la paracolon a été trouvé dans le 7e Aucun des micrococus pyogenes rencontrés ne s est trouvé résistant à la bacitracine Quatre des sujets qui ont survénu ont reçu 300.000 unités de bacitracine 2 grammes de chloromycétine et 2 grammes d érythromycine entraitement combiné pendant une période qui a varié de douze à cinquante deux jours On n a pas noté d action néphrotoxique

Zum Problem der Septikämie bei Verbrennungen. CURTIS P ARTZ, HARRY S SOROFF ROBERT D PILLSBURY UND ROBERT P HUMMEL.

In 31 von 61 Verbrennungsfallen führte die Septicämie zum Tode während in 14 Fällen Flüssigkeits-Elektrolyt-Gleichkgewichtsstörungen fest gestellt wurden. Von 27 Patienten die den gleichen Grad von Verbrennungen hatten zeigten 17 Septicämie mit Gram positiven Erregern und 10 mit Gram- negativen Erregern. Bei allen 17 Fällen wurde Micrococcus pyogenes gefunden. In 5 Fällen war die Gram-negative Septicämie durch Pyocyaneus, in 4 durch den Paracolon und in einem durch Proteus verursacht. Infektionsbeginn und die Lebensdauer nach dem Verbrennungstag waren in beiden Gruppen durchschnittlich die gleichen. Der Tod durch Septicämie erfolgte jedoch früher bei der Gruppe die mit gram negativen Erregern infiziert war

Wunde Die Verhaltnisse beim Infektionsbeginn ergaben intakter Brandschorf in 14 Fällen, sich abstossende Schorfe in 11 Fällen excidierte Schorfe mit nekrotischem Fettgewebe in 4 und eine eitrig-granulierende Oberfläche in 2 Fällen. Die Wundoberfläche war mit den gleichen Organismen beladen die in der Blutkultur erschienen.

Überleben Sieben Patienten mit Septicämie überlebten. Die Gesamtausdehnung der Verbrennung und die Zonen mit Verbrennungen dritten Grades waren in entscheidendem Masse geringer als die in der tödlich verlaufenden Gruppe Micrococcus pyogenes war in 6 von 7 Fällen der Erreger in einem der Paracolon Keiner der gefundenen Micrococcus pyogenes waren Bacitracin-resistent. Bei 4 Überlebenden wurden 300,000 Einheiten Bacitracin 2 gr Erythromycin und 2 gr Chloromycetin kombiniert für eine Zeit von 12 14 Tagen gegeben. Nierenschädigung wurde nicht beobachtet.

El Problema de Septicemia en las Quemaduras. CURTIS P ARTZ, HARRY S. SOROFF ROBERT D PILLSBURY Y ROBERT P HUMMEL.

La septicemia estuvo asociada en la muerte de 31 de 61 pacientes quemados en tanto que el desequilibrio líquido y electrolítico se notó en 14. Los datos de 27 pacientes que tenían la misma extensión de quemaduras mostraron septicemia gram positiva en 17 casos y gram negativa en 10. En los 17 primeros pacientes había en todos, Micrococcus pyogenes. De los otros 10 en 5 había Pseudomonas en 4 Paracolon y en 1 Proteus. El tiempo de supervivencia promedio fue el mismo en ambos grupos a partir de la quemadura, pero la muerte ocurrió mas precoz despues de la presencia de la septicemia en el grupo gram negativo

Lesión. La escara estaba intacta en 14 casos, esfacelandose en 11 esfacelada y con necrosis de grasa en 4 y con superficie granulante purulenta en 2. Las lesiones presentaban el mismo microorganismo que se encontró en el cultivo de sangre.

Supervivencia. Siete pacientes que sufrieron septicemia sobrevivieron La extensión de quemadura y las áreas con quemaduras de tercer grado fueron notablemente menores que en el grupo que murió De los sobrevivientes 9 tuvieron septicemia causada por M.Pyogenes y 1 por Paracolon. Ninguna de las cepas de M Pyogenes fue resistente a la bacitracina. En cuatro de esos pacientes, se dieron 300 000 unidades de bacitracina 2 gramos de eritromycina y 2 gramos de cloromycetin en combinación por períodos que variaban de 12 a 52 días. No se observó lesión tóxica del riñón.

Control and Prophylaxis of Local Infections in Burns. VITTORIO BERGONZELLI, Dott, *Torino, Italy*

With material taken in a sterile manner from burned areas, numerous cultures were used which favoured the growth of various bacterial colonies (streptococci, staphylococci, clostridia, etc) On these cultures several antibiotics and sulfonamides were essayed (antibioticogramma) The necessity of sterile dressings in aseptic rooms with a well-trained staff (sterile masks, gowns and gloves) in specialized centers, is emphasized

Beherrschung und Prophylaxe von Lokalinfektionen bei Verbrennungen. VITTORIO BERGONZELLI

Zahlreiche Kulturen, die das Wachstum verschiedenartiger Bakterienkolonien (Streptococcen, Staphylococcen, Chlostridium) begunstigen, wurden mit steril entnommenem Material von verbrannten Korpergebieten angelegt Einige Antibiotica und Sulfonamide wurden an diesen Kulturen ausprobiert (antibioticogramme) Auf die Notwendigkeit steriler Verbandstechnik in aseptischen Operationsraumen durch gut ausgebildete Krafte (Sterile Masken, Mantel und Handschuhe) in besonders dafur bestimmten Zentren wird besonders hingewiesen

Contrôle et Prophylaxie des Infections Locales Dans les Brûlures. VITTORIO BERGONZELLI

De nombreuses cultures ont été faites après des prélèvements stériles sur des zones brûlées et on a vu se développer diverses colonies bactériennes (streptocoques, staphylocoques, clostridia, etc) On a essayé sur ces cultures de nombreux antibiotiques et de nombreux sulfamides (antibiogramme) On insiste sur la nécessité de pansements stériles dans des salles aseptiques dans lesquelles travaille un personnel bien entraîné (muni de masques, de casaques et de gants stériles), le tout se passant dans des centres spécialisés

Control y Profilaxis de la Infección Local en las Quemaduras. VITTORIO BERGONZELLI

Con material estéril tomado de áreas quemadas se practicaron numerosos cultivos para favorecer el crecimiento de varias colonias bacterianas (streptococci, staphylococci, clostridium, etc) En esos cultivos se ensayaron varios antibióticos y sulfonamidas (antibioticograma) Se enfatiza la necesidad de vendajes estériles, en cuartos asépticos con un personal bien entrenado (batas, guantes y cubrebocas estériles) en centros especializados

---

D. Burn Contractures

Combined Skin Plastic Operations for After-Effects of Facial Burns. PROFESSOR NICOLAI BLOKHIN, M D, *Corresponding Member of USSR Academy of Medical Sciences, Moscow, U S S R*

Combinations of various methods of skin plastics in cases of serious burns of the face are necessary to reduce the duration of treatment and give the most satisfactory results

Scar disfigurement is combined with serious functional disorder—inability to close the eyelids, constant conjunctivitis, with drying often leading to ulcerative keratitis and threat of blindness Eversion of the lips is often accompanied by constant loss of saliva

Our series consists of 68 patients with extensive disfiguring scars of the face From our experience the most effective treatment consists of combinations of local skin plastics and free thick skin grafts Where plastic substitution of almost all skin of the face is required, the operation is divided into several stages

At the first stage the middle part of the face is repaired—nose, cheeks, lower eyelids For replacement of the scarred skin of this region we have used a large bi-pedicled flap from the forehead, the frontal branches of the temporal arteries being included in the pedicles of the flap The donor area on the forehead is immediately covered with a dermatome split skin graft from the abdominal wall (Fig 52)

At the second stage the scars are removed from the lower part of the face, the defect being covered with a bi-pedicled flap taken from the submaxillary region The submaxillary wound is covered with a split skin graft (Fig 53)

At the third stage the scarred skin of the upper lip may be substituted by a narrow bi-pedicled flap from the hairy scalp, the pedicles containing the parietal branches of the temporal arteries (Fig 54 a and b) The scalp wound

REFERENCES

1 Liedberg, N C-F Reiss E., and Artz C P Infection in burns. III Septicemia a common cause of death Surg. Gyn. Obst 99 151 1954

Le Problème de la Septicémie Dans les Brûlures. CURTIS P ARTZ, HARRY S SOROFF ROBERT D PILLSBURY ET ROBERT P HUMMEL.

La septicémie a été la cause de la mort dans 31 cas sur 61 décès par brûlure alors que le déséquilibre hydrique et électrolytique n a entraîné d issue fatale que dans 14 cas. Les données relatives à 27 malades présentant la même surface brûlée font ressortir des septicémies à germe gram positif dans 17 cas et à germe gram négatif dans les 10 autres. Tous les 17 malades étaient infectés par le micrococcus pyogenes Dans 5 cas la septicémie à germe gram négatif a été due au pseudomonas dans 4 au paracolon et dans 1 au proteus Le début de l'infection et le temps de survie ont en moyenne été les mêmes dans les 2 groupes bien que la mort soit survenue plus tôt après l'installation de la septicémie dans le groupe gram négatif

Etat de la plaie Au moment de l installation de la septicémie il existait une escharre sèche dans 14 cas une escharre humide dans 11 une escharre excisée avec graisse nécrotique dans 4 et une surface de granulation purulente dans 2 cas. Le même micro-organisme a été retrouvé à la surface de la plaie que dans l'hémoculture

Survie Sept malades qui avaient présenté de la septicémie survécurent. La surface totale de la brûlure et celle de la zone brûlée au 3e degré était nettement moins importante que chez les malades ayant succombé Le micrococcus pyogenes a été l agent causal de la septicémie dans 6 sur 7 de ces cas alors que la paracolon a été trouvé dans le 7e Aucun des micrococcus pyogenes rencontrés ne s'est trouvé résistant à la bacitracine Quatre des sujets qui ont survécu ont reçu 300.000 unités de bacitracine 2 grammes de chloromycétine et 2 grammes d érythromycine entraitement combiné pendant une période qui a varié de douze à cinquante deux jours. On n a pas noté d action néphrotoxique

Zum Problem der Septicämie bei Verbrennungen. CURTIS P ARTZ HARRY S SOROFF ROBERT D PILLSBURY UND ROBERT P HUMMEL.

In 31 von 61 Verbrennungsfallen führte die Septicämie zum Tode während in 14 Fällen Flüssigkeits-Elektrolyt-Gleichgewichtsstörungen festgestellt wurden. Von 27 Patienten die den gleichen Grad von Verbrennungen hatten, zeigten 17 Septicämie mit Gram- positiven Erregern und 10 mit Gram negativen Erregern. Bei allen 17 Fällen wurde Micrococcus pyogenes gefunden. In 5 Fällen war die Gram-negative Septicämie durch Pyocyaneus, in 4 durch den Paracolon und in einem durch Proteus verursacht. Infektionsbeginn und die Lebensdauer nach dem Verbrennungstag waren in beiden Gruppen durchschnittlich die gleichen. Der Tod durch Septicamie erfolgte jedoch früher bei der Gruppe die mit gram-negativen Erregern infiziert war

Wunde Die Verhältnisse beim Infektionsbeginn ergaben intakter Brandschorf in 14 Fällen, sich abstossende Schorfe in 11 Fallen exzidierte Schorfe mit nekrotischem Fettgewebe in 4 und eine eitrig-granulierende Oberflache in 2 Fällen. Die Wundoberfläche war mit den gleichen Organismen beladen die in der Blutkultur erschienen.

Überleben Sieben Patienten mit Septicämie überlebten Die Gesamtausdehnung der Verbrennung und die Zonen mit Verbrennungen dritten Grades waren in entscheidendem Masse geringer als die in der tödlich verlaufenden Gruppe. Micrococcus pyogenes war in 6 von 7 Fällen der Erreger in einem der Paracolon. Keiner der gefundenen Micrococcus pyogenes waren Bacitracin-resistent. Bei 4 Überlebenden wurden 300,000 Einheiten Bacitracin 2 gr Erythromycin und 2 gr Chloromycetin kombiniert, für eine Zeit von 12 14 Tagen gegeben Nierenschadigung wurde nicht beobachtet

El Problema de Septicemia en las Quemaduras. CURTIS P ARTZ, HARRY S SOROFF ROBERT D PILLSBURY Y ROBERT P HUMMEL.

La septicemia estuvo asociada en la muerte de 31 de 61 pacientes quemados, en tanto que el desequilibrio líquido y electrolítico se notó en 14 Los datos de 27 pacientes que tenían la misma extensión de quemaduras mostraron septicemia gram positiva en 17 casos y gram negativa en 10 En los 17 primeros pacientes había en todos, Micrococcus pyogenes. De los otros 10 en 5 había Pseudomonas en 4 Paracolon y en 1 Proteus El tiempo de supervivencia promedio fue el mismo en ambos grupos a partir de la quemadura, pero la muerte ocurrió mas precoz despues de la presencia de la septicemia en el grupo gram negativo

Lesión. La escara estaba intacta en 14 casos, esfacelandose en 11 esfacelada y con necrosis de grasa en 4 y con superfice granulante purulenta en 2. Las lesiones presentaban el mismo micro-organismo que se encontró en el cultivo de sangre.

Supervivencia. Siete pacientes que sufrieron septicemia sobrevivieron. La extensión de quemadura y las áreas con quemaduras de tercer grado fueron notablemente menores que en el grupo que murió De los sobrevivientes 9 tuvieron septicemia causada por M.Pyogenes y 1 por Para colon. Ninguna de las cepas de M. Pyogenes fue resistente a la bacitracina. En cuatro de esos pacientes se dieron 300 000 unidades de bacitracina, 2 gramos de eritromycina y 2 gramos de cloromycetin en combinación por períodos que variaban de 12 a 52 días. No se observó lesión tóxia del riñón.

Lippenektropien und zu Defekten der Nasenflugel und des Ohrmuschelrandes Solche Patienten haben funktionelle als auch kosmetische Defekte, welche plastische Operationen unentbehrlich machen

Der Autor, der uber 60 Operationen schwerer Verbrennungseffekte des Gesichts ausgefuhrt hat, bringt in seiner Arbeit eine Einteilung der Entstellungen und schlagt einige Standardmethoden, meistens eine Kombination von lokaler Hautlappenplastik mit freier Hauttransplantation, vor

Die Arbeit wird durch schematische Zeichnungen und Photographien illustriert, die Operationsplane fur die Plastik und deren Ergebnisse zeigen

Operaciones Plasticas Combinadas Para Corregir Secuelas de Quemaduras Faciales. Nicolai Blokhin

Las quemaduras extensas de la cara dejan invariablemente después de cicatrizar, volteados hacía afuera parpados y labios y defectos en los poros nasales y helix

Estos pacientes presentan defectos funcionales y estéticos que ameritan operaciones plásticas

Habiendo hecho cerca de 60 operaciones, por efectos severos de quemaduras faciales, el autor presenta una clasificación de las deformidades, y sugiere esquemas uniformes de operación, principalmente combinando la dermoplastía local con la libre transplantación de piel

El trabajo es ilustrado con diagramas y fotografías, mostrando esquemas de operaciones plásticas y sus resultados

---

Successful Correction of Extensive Scar Contractures of the Neck Using Split Skin Grafts.

Thomas D Cronin, M D, F A C S, *Houston, Texas*

Only the very severe broad scar contractures of the anterior neck will be discussed in this paper Those forming narrow bands suitable for the use of a Z plasty will not be considered The types under discussion, all require skin replacement

The anterior neck being a flexor surface, and a very mobile one at that, is subject to complete obliteration when the skin is lost The scar tissue of healing will contract inexorably regardless of efforts to prevent it by any measures short of satisfactory skin replacement Despite the difficulties associated with relief of neck contractures, relatively little attention has been given to the subject in the literature

A review of the English speaking literature gives the impression that the majority of writers favor the use of pedicle flaps, despite the magnitude of multiple surgical procedures entailed by this decision Obviously, if surgeons have gone to such lengths to secure skin coverage, it must mean that simpler methods, such as the use of split skin grafts (ordinarily very successful in most situations) have proved unsatisfactory in their hands

Dowd (1927)[1], Mixter (1933)[2], Coughlin (1939)[3], MacCollum (1938)[4], and Aufricht (1944)[5] favor the use of pedicle flaps Aufricht shows some excellent results with tubed flaps, but points out the disadvantages of five to six operations over four to six months and the resultant high cost McIndoe (1949)[6], speaking of neck contractures, stated, "While a few may be relieved by free grafts, the majority are not" He stated a preference for double abdominal tube flaps

Babcock (1932)[7], Padgett (1932)[8], Brown-Byars-Blair (1935)[9], Kazanjian (1936)[10], Blocker (1941)[11], report the use of free full thickness skin grafts Padgett and Stephenson (1948)[12], May (1947)[13], Greeley (1944)[14], prefer split skin grafts for most cases May also advises resection of the platysma in long-standing contractures

Kazanjian mentioned the use of an elastic bandage to be worn around the neck for several months Other than this, no mention of positive measures to combat postoperative scar contracture have been found; except that of overcorrection of the defect by an excess of skin, which measure is a common practice in plastic surgery, in situations where some contracture is expected While this practice may succeed in part, the surface will be unsightly due to the wrinkles and folds of skin produced as the underlying fibrous tissue contracts, reproducing some or all of the original deformity

Etiology

The most common cause of cervical contractures is thermal burns Less frequently chemical burns and severe infections with gangrene, or lysis of the skin may be the cause In the present series, all of the cases were due to thermal burns

Methods of Repair

Three major types of skin replacement have been used to correct anterior cervical contrac-



Fig 52

can usually be easily closed by suture Pedicles of hairy scalp may be used to form eyebrows commonly absent in scar deformities of the face (Fig 54 c and d) Figures 55-56 and 57-58 show the results of operations performed by the above-described methods on patients with extensive scar deformities of the face following burns It is not always possible to carry out this plan of operation routinely and some cases have to be individualized.

Figures 59-60 show a patient in whom a local skin plastic had to be combined with Filatoff's tubed flap He had a serious facial burn with loss of the left eye and ulcerative keratitis of the right eye. The plastic operation made it possible to save the sight of the latter

Figures 61-62 show a patient with serious scar deformities of the face with extensive wound of the forehead. All the skin of the forehead was replaced by a free split skin graft the everted eyelids and lips being likewise corrected by free grafting For the nose a small Filatoff flap was required.

These combined methods while not giving

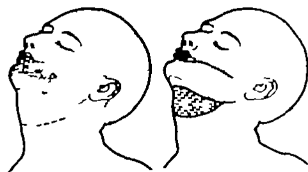


Fig. 53

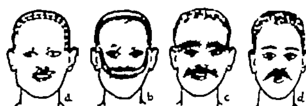


Fig. 54

perfect results often yield marked improvement in burn scar disfigurements of the face. An exchange of experiences in this field will serve to promote further improvement and development of more perfect methods

Les Opérations Combinées de Plastie Cutanée dans le Traitement des Séquelles de Brûlure de la Face. Nicolai Blokhin

Les brûlures profondes et étendues de la face entraînent de façon invariable des cicatrices, des éversions labiales et palpébrales et des déformations des narines et des helix De tels malades présentent des troubles tant fonctionnels qu'esthétiques qui rendent les opérations plastiques indispensables

Ayant pratiqué plus de 60 opérations dans des cas de séquelles graves de brûlure de la face *l'auteur présente dans son article une classification* des déformations et préconise un petit nombre de petits schémas opératoires standards qui, la plupart, combinent la dermoplastie locale avec la transplantation de peau libre

L'article est illustré par des diagrammes et des photographies qui montrent les schémas des opérations plastiques et leur résultat.

Kombinierte hautplastische Operationen bei Spätschäden nach Gesichtsverbrennungen. Nicolai Blokhin

Tiefe ausgedehnte Verbrennungen des Gesichts führen unweigerlich zur Narbenbildung, Lid und



Figs 55-58 (top row left to right)
Figs. 59-62 (bottom row left to right)

Free full thickness skin grafts

Advantages Postoperative contracture is minimized, due to the thickness of the graft If successful, only one session is required

Disadvantages Free full thickness skin grafts are very definitely less certain of a "take" because of their thickness and because this is an area difficult to immobilize satisfactorily The donor site must be covered with a split skin graft, thus causing some mutilation of two different areas

Split skin grafts

Advantages. These grafts are usually available in generous amounts, even in extensively burned patients There is minimal mutilation of the donor sites With the Padgett dermatome, large, one-piece grafts of uniform thickness can be obtained easily When a thick, split skin graft is properly splinted in the postoperative period, excellent results can be anticipated (Figs 63-66) Only one operation is required

Disadvantages Recurrence of some of the contracture with wrinkling of the graft is almost certain to occur when, as is usually the case, no splinting is used (Figs 63 and 65) Thin grafts are especially prone to secondary contracture and should not be used in this situation



FIG 65 (top left and center) (4-17-47) Appearance of J M when first seen ten months following a gasoline burn (Top right and bottom left) (8-22-47) Adjustable splint which was worn continuously for six months (Bottom center and right) (7-20-51) Appearance four years later, showing permanent correction with normal neck line Neck contracture corrected at one operation May 1947 A year later, a small scar contracture due to loss of graft over the larynx was repaired with a graft Vertical scar bands at edges of graft on each side of neck relieved by Z plasties In subsequent cases the Z plasties have been done at the time of the original operation



FIG 63 (left) (3-30-43) Appearance of boy (J C) when first seen four months after receiving extensive flame burns. (Center and right) (8-5-47) Appearance four years after release of scar contracture and immediate split skin grafting. No splinting other than a plaster cast for two or three weeks. The graft is wrinkled and moderately contracted. Failure to do a Z plasty between the graft and vertical edge of wound (center) has resulted in a thick scar band

tures flaps free full thickness skin grafts and split skin grafts

Flaps

Advantages Flaps undergo little or no contracture in the post-operative period. They are best where a deep loss of subcutaneous tissues must be replaced such as over the point of the chin A supple movable surface of healthy skin may be obtained, which if thinned and modeled expertly may be noticeable only by its difference in color

Disadvantages In the contractures under discussion, very wide, large flaps are necessary for adequate correction An adult might require a flap some six or seven inches square thus a large area of scarring and mutilation is produced at the donor site. Near by donor sites such as the chest are frequently not available due to the original burn and one may have to go to the back or other more distant site

Many (five or six, or more) major operations and, perhaps, several touch up procedures may be necessary Aside from the general risk to the patient of many anesthetics there is always the risk of loss of all or some part of the flap due to circulatory trouble Unless great care is taken in modeling the thickness of the flap may obliterate some of the normal contours of the chin or neck.



FIG. 64. A boy (R.N.S.) severely burned when he threw gasoline on a fire (Top left) (4-16-48) Ready for skin grafting. (Top right and bottom left) (5-27-49) Typical wrinkled contracted graft when no splinting is used. Practical difficulties associated with the deep burns of shoulders chest and back prevented adequate splinting. (Bottom right) (2 21-51) Appearance of neck seventeen months after excision of scar followed by application of thick, split skin graft and splinting for four months.

years later is probably an average result, considering the lack of splinting Note the wrinkling and contracture of the graft The next opportunity to try out the splint idea occurred in 1947, when (J M) was seen (Fig 65)

The Operation

All of the scar is excised from the front of the neck down to normal subcutaneous tissue, until the neck can be completely extended If there is any doubt as to the completeness of the hemostasis, or as to the possibility of localized areas of fat necrosis, it is best to delay application of the skin graft, and apply a vaseline or Furacin dressing, leaving it undisturbed for seven to ten days, by which time, a fine bed of granulation tissue will have formed The thick split skin graft may then be applied with minimal chance of any loss from hematoma or localized fat necrosis Loss of a small area over the larynx, due to swallowing movements is not uncommon (Fig 66, top) Satisfactory healing may occur, or later on a small graft and/or a small Z plasty may be indicated It is important to break up the vertical lateral borders of the graft with a Z plasty at the first operation (Figs 66, top and 67, top right) If this is not done, it will probably be required later to correct the scar band which is almost certain to form (Figs 63, right and 65, bottom right)

The Splint

About a week after the skin graft has been applied to the neck, the patient is asked to sit up with the chin tilted up slightly A plaster cast of the front of the neck and chin is then made From this, the splint maker constructs a positive model, which he will use for construction and fitting of the brace The brace is made of a piece of metal with the general contour of



Fig 67 A girl (S A.S) was burned severely when her clothing caught on fire (Top left) (8-22-51) The contracture (Top right) (9-11-51) Release of contracture by excision of scar Note the small flaps on lateral borders to form Z plasty with the skin graft and prevent vertical scar bands (Bottom left) (11-16-51) Adjustable splint worn for about six months (Bottom right) (11-16-51) Appearance of graft two months postoperative Note raw area over left border of jaw, due to inaccurate fitting of the splint and consequent excessive pressure



Fig 67 (Cont)
(Top) (4-11-53) Appearance nineteen months later, grafts smooth, normal, vertical and horizontal curves (Bottom) (8-3-53) One month after completion of abdominal tube flap transfer to build up a more normal prominence of chin Further adjustment is indicated to improve the symmetry



FIG 66 A girl (E.A.H.) age twenty three months burned severely when clothing caught on fire. (Top left) (5-9-51) Ready to be skin grafted (Top right) (8-21-51) Appearance three months later Despite the application of split skin grafts to the neck, severe contracture has occurred because no efficient means of splinting the neck could be devised because of the burns of the chest. (Bottom) (9-7-51) Adjustable splint worn continuously for five months In this case it was necessary to extend a strut-down the back, in order to retain the head in proper position



FIG 66 (Cont.)
(Top left) (9-7-51) Appearance seventeen days after release of contracture and skin grafting. Note the Z plasty done on each side of the neck at the junction of the graft with the normal skin. Note that where pressure of the splint has been adequate the graft is smooth but under the chin there is some wrinkling due to lack of proper fit. The usual loss of skin over the larynx is evident. (Top right) (9-17-51) Ten days later further evidence of lack of proper pressure beneath the chin and in the right clavicular region These areas were corrected by additional padding with foam rubber (Bottom) (4 12-55) Appearance three and a half years later result of a single operation to correct the scar contracture The scarring at the junction of the graft with the face is to be excised

DISCUSSION OF SPLIT SKIN GRAFTS

In general, the use of the split skin graft has proved to be the most satisfactory method of skin replacement in 3 burns and it has proved to be a satisfactory method of correcting many scar contractures. Despite the tendency to con tracture, it has been used successfully to line cavities such as, the orbit, vagina and urethra

As pointed out by McIndoe (1939)[18] the secret of success is the wearing of a mold or form continuously for about six months, until all tendency for contracture has subsided

Split grafts show minimal contraction on convex surfaces, where they are kept continually stretched out. On flexor or concave surfaces, there is usually less resistance to the forces of contracture, so that the graft often shrinks or wrinkles, and bows across the concavity as the underlying fibrous tissue contracts. For this reason split skin grafts, as ordinarily used on the anterior neck, are only partly successful or possibly outright failures The writer felt that if the contracture of skin grafts lining a cavity could be prevented by splinting with molds that the same could be accomplished with split skin grafts of the anterior neck by proper splinting

In 1942 a boy (J C) (Fig. 63) with a severe neck contracture was seen A split skin graft was used to cover the neck after removing the scar An attempt was made to splint the neck with a plaster cast but this was not carried out adequately after the writer was ordered to active duty in the Army The result shown four

which, furthermore, was poorly designed This case will have to be done over It emphasizes, however, the importance of two points the use of a thick, split skin graft and prompt (within ten days postoperative) application of a well designed splint

In all cases except one the skin graft was applied immediately at the time of scar excision Application of the graft was delayed a week in one patient because of unsatisfactory hemostasis

In three cases, a small area of the graft was lost, due to swallowing movements of the subjacent larynx

SUMMARY

1 The advantages and disadvantages of the use of pedicle flaps, free full thickness skin grafts and split skin grafts in the correction of severe, widespread neck contractures has been discussed

2 Release of the scar contracture and coverage with thick, split skin is the simplest method, but in the past the grafts have generally contracted and become wrinkled, due to lack of the necessary pressure against the graft and the neck, to retain the normal curves against the forces of contracture

3 Two types of splint, to accomplish this, have been described

4 The splint should be worn continuously for about six months

5 In five out of six cases, excellent results were obtained

University Prof Bldgs
6615 Travis Street,
Houston 25, Texas, U S A

REFERENCES

1 Dowd, C N Surg, Gyn and Obst, 44 396, 1927
2 Mixter, C G N England J Med, 208 190, 1933
3 Coughlin, W T Surg, Gyn and Obst, 68 352, 1939
4 MacCollum, D W Am J Surg, 39 275, 1938
5 Aufricht, Gustave Surg, 15 75, 1944
6 McIndoe, A H Post Graduate Med, 6 187, 1949
7 Babcock, W W S Clin N America, 12 1405, 1932
8 Padgett, E C J A M A, 98 18, 1932
9 Brown, J B, Byars, L T, and Blair, V P Southern M J, 28 408, 1935
10 Kazanjian, V H New England J Med, 215 1104, 1936
11 Blocker, T G, Jr Southern Surgeon, 10 849, 1941.
12 Padgett, E C, Stephenson, K L Plastic and Reconstructive Surg, Springfield, Ill, Charles C Thomas, 1948
13 May, Hans Reconstructive and Reparative Surg, Philadelphia, F A Davis Co, 1947
14 Greeley, P W Surgery, 15 224, 1944
15 McIndoe, A H Ann Surg, 38 176, 1939

Correction Satisfaisante de Contractures Cicatricielles Etendues du Cou a l'Aide de Greffes Dermo-Epidermiques. THOMAS DILLON CRONIN

De nombreux chirurgiens ont tenté la réparation des contractures graves du cou par excision de la cicatrice et greffes dermo-épidermiques D'une façon générale les résultats ont été peu probants par suite de la contracture postopératoire Cette contracture peut être évitée par (1) brisure des bords lateraux verticaux du greffon cutané par des plastics en Z au moment de l'application du greffon (fig 4e et f, 5b), (2) il est très important cependant d'utiliser un appareillage à coussinet (fig 3c et d, 4c et d, 5c) qui doit être appliqué 7 à 10 jours après l'intervention et porté continuellement jour et nuit pendant environ 6 mois L'appareil doit être soigneusement adapté de façon à conserver la forme désirable du cou compte tenu particulièrement de deux courbures (fig 6), la courbure horizontale à la jonction du menton et du cou et la courbure verticale qui accentue également la courbure ou l'angle à la jonction du cou et du menton On devra utiliser un greffon dermo épidermique épais L'auteur a obtenu d'excellents résultats dans 5 cas sur 6

Erfolgreiche Narbenkorrektur mit Spalthautlappen bei ausgedehnten Narbenkontrakturen am Halse. THOMAS DILLON CRONIN

Viele Chirurgen haben die Beseitigung von schweren Kontrakturen am Halse durch Exzision der Narbe und Transplantation von Spalthautlappen versucht Die Ergebnisse waren im allgemeinen, infolge der postoperativen Kontraktur, schlecht Dieser Kontraktur kann vorgebeugt werden durch (1) Brechen der vertikalen lateralen Rander des Transplantates durch z-formige Einschnitte zur Zeit der Einbringung des Transplantates (Abb 4e und f, 5b), (2) Von groszter Bedeutung jedoch ist die Anwendung einer gepolsterten Schiene (Abb 3c und d, 5c), die 7 bis 10 Tage nach der Operation angepaszt und etwa 6 Monate lang ununterbrochen bei Tag und Nacht getragen werden musz Die Schiene musz sorgfaltig unter besonderer Beachtung von zwei Kurven angepaszt sein, um die gewunschte Halsform zu erhalten (Abb 6), die horizontale Kurve an der Vereinigungsstelle von Kinn und Hals und die senkrechte Kurve, die zugleich die Kurve oder den Winkel an der Kinn- Halsvereinigungsstelle betont Ein dicker Hautspaltlappen musz genom-

the neck and lined with a thin layer of foam rubber and covered by soft calf skin. Great care must be taken to avoid loss of the desired contour as the lining is applied to the splint. This is the greatest cause of inadequacy in a splint

As shown in the diagram (Fig 68), two curves are important One is the horizontal curve at the junction of the chin with the neck. It should be U shaped rather than V shaped in order to counteract any tendency for a scar band to form in the midline of the neck. In padding the splint there is a tendency for the splint maker to build up the sides too much, producing a V instead of a U and therefore permitting the formation of a vertical scar band

The second and most important curve is the one seen in the sagittal section. This too should accentuate the curve or angle at the junction of chin and neck. Specific attention should be given by the splint maker to building up this critical area as an otherwise successful operation may result in partial failure due to lack of properly applied pressure from the splint.

Perhaps the safest type of splint is the adjustable type, as shown in Figs. 65 66 and 67 An accurately fitted collar piece can be raised or lowered by adjusting the set screws Support on the back of the neck and occiput is necessary to hold the head and neck forward in suitable position.

A simpler type of splint (Fig 69) consists of a carefully fitted collar of a height adequate to keep even pressure against the graft and keep the chin slightly elevated. As this is not adjustable great care should be taken in the fitting, to see that it is of sufficient height to keep the chin extended.

The splint should be worn continuously day and night for about six months.

Results

Six patients with very severe anterior neck contractures have been treated with thick split skin grafts followed by splinting of the neck Excellent results have been obtained in five cases. One was regarded as a poor result In this case the burns were very extensive and there was a limited supply of donor skin available for treating various contractures. For this reason, a rather thin graft was taken and there was considerable delay in application of a splint

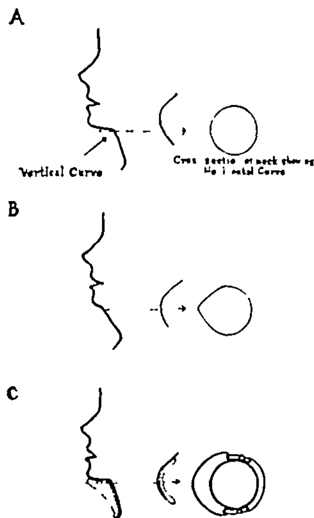


Fig 68A. Normal vertical and horizontal curves of neck. B As a scar band forms the vertical curve approaches a straight, short line A cross section of the neck shows the curve has become an angle. C Splint is shaped to preserve the normal vertical and horizontal curves



Fig 69 Collar type splint must be very carefully fitted to assure adequate height and shape Note that a little additional padding of foam rubber has been added to accentuate the desired vertical and horizontal curves



Fig 71 (left) Ten-year old child with central web contracture from burn (Center) Eight days ve Z-plasty correction of contracture with cast in place (Right) Healed No limitation of ration of chin-neck line



Fig 72 (top left) Secondary burn contracture in eight year old child Inadequate correction with split graft at chin-neck level (Top right) Excision of hypertrophic scars of skin graft borders, large local right lateral flap rotated transversely, left flap obliquely and inferiorly, and release along margin of chest-neck skin for upward advancement The residual defect on chest is filled in with a split graft (Bottom left) Right lateral view showing good neck appearance and improvement of chin-neck line (Bottom right) Showing extent of extension and flexibility obtained by combination of flaps and grafts

Following operation and when sutures have been removed and the initial healing has occurred—one week to ten days, the cast and nasogastric tube are discontinued

Neck extension is favored and contraction of graft counteracted by having the patient wear a cervical wrap collar dressing of Sayre type This is worn for an additional one and a half to two months

If a neck contracture is so severe as not to allow full neck extension, the cast must be fitted to the patient nonetheless and compensation made on the day of surgery by extending the neck portion of the cast at time of operation The pre-formation of the cast, however, is most advisable both to save time and for ensuring a pretrial better fitting

When the contracture is minimal and limited to a web type, a Z-plasty procedure alone is adequate and provides the advantage of minimum operative procedure, good flexibility, and tissue of proper consistency and color for the area

Contractures of more than minimal amount require added tissue, a Z-plasty procedure alone being often insufficient Pedicle flaps from a distance are frequently more bulky than desirable, lacking in color match, requiring several stage operations They are apt to become a depot for fat deposit, deformity thus increases in later periods Pedicle flaps may be essential if no local flap tissue is available and the burn

men werden. Bei fünf von 6 Fällen wurden ausgezeichnete Resultate erzielt.

Correccion de Extensas Cicatrices del Cuello Con In Jertos Intermedios de Piel. THOMAS DILLON CRONIN

Muchos cirujanos han tratado de reparar la contractura grave del cuello por resección de la cicatriz y ampliación de injerto intermedio Los resultados generalmente han sido pobires debido a la contracturapost-operatoria la cual puede prevenirse por (1) zetaplastías en los bordes laterales del injerto (2) La utilización de una férula acojinada que debe utilizarse desde el décimo día post-operatorio hasta el sextomes continuamente día y noche

---

Neck Burns—Early and Late Treatment.

WILLIAM HAMILTON FRACKELTON M D, F A C S, *Department of Surgery Marquette University, Milwaukee, Wisconsin*

Head and neck motions and tracheal deglutition movements hinder successful primary skin graft covering of neck burns The same factors interfere with optimum successful correction of neck contractures secondary to burns. Split skin grafts are universally used for initial covering of third degree burned cervical areas Free grafts—split or full thickness-, and pedicle flaps from a distance or local flaps, such a Z-plasty *or rotational—are used for secondary correction*

For initial covering of a burn wound the successful result of a split graft is enhanced by maintaining neck hyperextension and neck immobility This is secured by head posterior neck body cast to nullify movement during the post operative period.

The procedure is not applicable if the acute burn is both dorsal and ventral unless the cast can be so arranged as not to interfere with care of the dorsal burn area. The cast should be constructed a few days prior to the grafting procedure and should be tested for comfort and fixation prior to the day of surgery

The disturbing effect of tracheal motions as to graft healing is lessened by feeding through a polyvinyl nasogastric tube. Such a tube is almost routine in extensive burn feeding. In any event it can be used for its local value as above even for a patient with limited area neck burn.

For secondary contractures these same two aids—cast and tube are used. The use of a cast is particularly helpful especially when suture lines or grafts lie over the trachea at base of the neck. The construction of the cast is done with the patient prone and with neck extended as much as possible. A stockinette is put over head, neck and trunk Heavy felt pads are placed around the head transversely, over the neck, spine and hip areas with cut-outs over the spinous processes and the body prominences of the hip Plaster slabs are laid upon these and allowed to harden

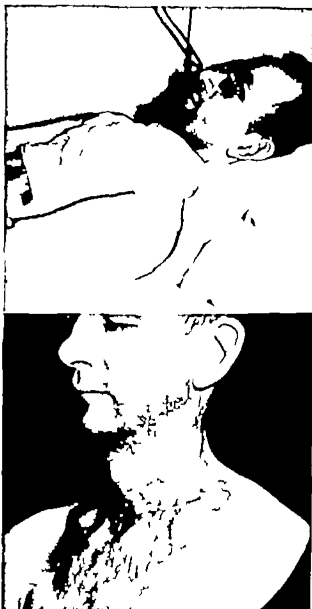


FIG. 70 (top) Patient with acute anterior neck burn neck stabilized by a posterior plaster shell Minimal head piece because of healing second degree burn of forehead and face Head bandaging is removed in this photograph (Bottom) Healed split grafts over side of neck, lower neck and upper chest, nine days post-grafting.

by the use of a local flap swung transversely into the exposed portion of the neck and chin, supplemented by free grafts, and by maintaining the head and neck in extended position during healing with mechanical fixation.

REFERENCES

1 Aufricht, G "Evaluation of pedicle flaps versus skin grafts in reconstruction of surface defects and scar contractures of the chin, cheeks, and neck" Surgery, 15 75, 1944
2 Byars, L T "Free full thickness skin grafts, principles involved and technique of application" S G O, 75 8, 1942
3 Davis, J S "Present evaluation of the merits of the Z-plastic operation" J Pl & Reconst Surg, 1 26, 1946
4 Smith, F "Planning the reconstruction" Surgery, 15 1, 1944

Brûlures du Cou—Traitement Immédiat et Traitement Tardif. WILLIAM H FRACKELTON

Les mouvements de la tête, du cou et de déglutition trachéale gênent la recouvrement primaire par greffe cutanée des brûlures du cou et la correction des contractures du cou secondaires à des brûlures Dans la couverture immédiate des plaies par brûlure du cou, les résultats des greffes dermo-épidermiques sont augmentés quand on maintient le cou en hyperextension et en fixation à l'aide d'un plâtre crânio-cervico-thoracique On diminue les mouvements de mobilisation trachéale par déglutition en mettant en place une sonde nasale pour l'alimentation

Dans le cas de traitement de constractures secondaires, les mêmes procédés d'appoint sont mis en oeuvre La combinaison de lambeaux locaux, de plastie en Z et par rotation permet l'établissement de lignes transversales désirables et permet le transfert du tissu local sur les zones du cou les plus visibles Les espaces résiduels qui persistent après exérèse du tissu cicatriciel de contracture ou après relâchement sont remplis à l'aide de greffes libres

Après guérison initiale tant des brûlures primaires que de la reconstruction secondaire, on enlève plâtre et sonde nasale On empêche la contracture du greffon en faisant porter au malade pendant 2 mois un col en pélerine fait de tissu qui maintient le cou en extension

Verbrennungen am Halse, Fruh—und Spat behandlung. WILLIAM H FRACKELTON

Kopf-, Hals- und Schluckbewegungen behindern die primare Deckung von Halsverbrennungen durch Hauttransplantate oder die Korrektur von Kontraktionen am Hals infolge von Verbrennung

Bei der sofortigen Deckung von Brandwunden am Halse werden die Erfolge von Spalthautlappen erhoht durch Aufrechterhaltung von Überstreckung des Halses zusammen mit Ruhigstellung mittels eines ruckwartigen Kopf-, Hals- und Rumpfgipsverbandes Storende Schluckbewegungen werden durch Futterung mit der Nasensonde verringert

Bei sekundaren Kontrakturen werden dieselben Hilfsmittel—Gipsverband und Magensonde—angewandt Kombinationen von Nahlappenplastiken—Z-Plastik und Rotationslappen—stellen wunschenswerte transversale Falten her und bringen ortsstandiges Gewebe an die sichtbaren Stellen des Halses Restdefekte, die durch das Losen und Entfernen von Narbenkontrakturen verblieben sind, werden mit freien Hauttransplantaten gedeckt

Nach anfanglicher Heilung entweder von primaren Brandwunden oder nach sekundarer Wiederherstellung werden Gips und Magen-Nasensonde fortgelassen Der Schrumpfung des Transplantates wird dadurch entgegengewirkt, daß man den Patienten 2 Monate lang einen Halswickelverband tragen laßt, wodurch die Streckung des Halses beibehalten wird

Quemaduras del cuello. Tratamiento Precoz y Tardío. WILLIAM H FRACKELTON

Los movimientos de la cabeza, del cuello y de deglución traqueal son estorbados por la cubierta primaria con injerto de piel de las quemaduras del cuello y la corrección secundaria de las contracturas tambien del cuello debidas a quemadura

El éxito de la aplicación de injertos de mediano espesor para la cubierta inmediata de las quemaduras del cuello es mejorado y mantenido por la inmovilidad e hiperextensión del cuello, asegurada por un molde de ye so de cuerpo a cabeza por la parte posterior del cuello Los disturbios en los movimientos de deglución traqueal son disminuidos mediante una sonda gástrica introducida por la nariz

Para contracturas secundarias se utilizan esos mismos moldes para inmovilizar y la misma songa gástrica La combinación de colgajos locales, ya por zetaplastias o por rotación establecen las líneas trasnversas necesarias y llevan tejido de la región a las áreas mas expuestas del cuello Los espacios descubiertos que se originan al resecar las cicatrices de contractura son cubiertos con injertos de piel

Despues de la cicatrización inicial de cualquier herida por quemadura o de reconstrucción secundaria del cuello el molde de yeso y la sonda gástrica deben retirarse La contractura de los injertos es contrarrestada mediante un vendaje en forma de collar que mantiene el cuello en extensión durante dos meses

---

Cervical Burn Contractures. A New Technique: "Combination Cervicoplasty." HUSSNI EL SAYED HIGAZI, F R C S, F R C S E, F A C S,

contracture is practically such as to make the symphysis of the mandible and the sternal notch contiguous Such a severe contracture may represent at the uncorrected state a line from symphysis to sternal notch of only 5 cms. That same area when contracture is released may measure on the patient in extended neck position a linear amount of 19 cm

A combination of local flaps both Z-plasty and rotational establish desirable transverse lines and bring local tissue into the more visibly exposed portions of the neck. Residual defect space left from the release and removal of contracture scar is filled in with a free graft—full-thickness or heavy split graft Such a procedure often will correct extensive contractures and gives the advantage of operative correction in but a single stage

Summary

Skin grafting of a neck burn area is enhanced as to success by negating neck movements with a head posterior neckback preformed cast. Undesirable deglutition movements are minimized by the use of nasal gastric tube during the healing time of the graft

Secondary neck burn contractures even though quite extensive can often be corrected

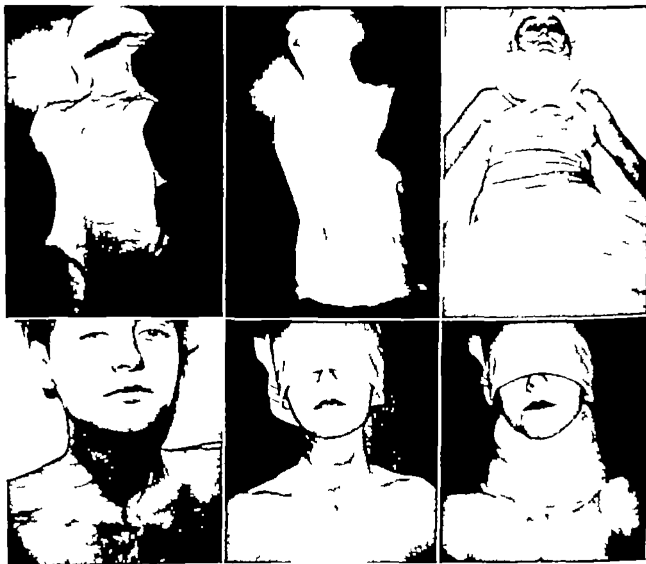


Fig. 73 (top left and center) Preconstructed dorsal back-neck-head cast anterior and exterior views (Top right) Patient on first postoperative day showing immobility in cast, the presence of nasogastric tube and bulky compression dressing at neck. (Bottom left) Eight days postoperative showing well healing graft over trachea (Bottom center) Three weeks postoperative showing healed graft, flaps and Z-plasty (Bottom right) Quilted lengthy strip band maintaining neck extension during period of final healing and resolution of graft

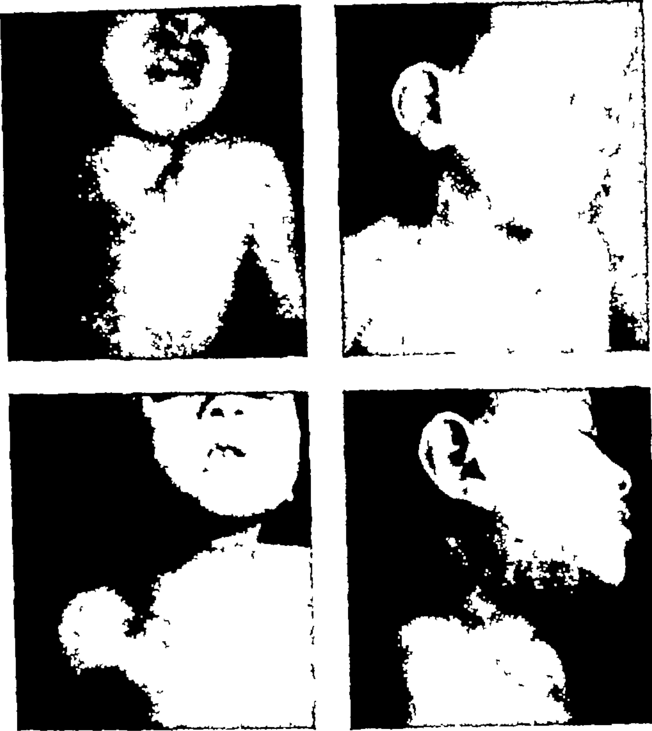


Fig 76

tions (Figure 78 for Z-plasties done twice with an interval of one year)

(3) It has its definite limitations in multiple contractures

(4) It is to be used nearly always in combination with other cervicoplasties and so I have avoided its use as a sole definitive method

Local flaps other than Z-plasties Shoulder transposition flaps can be used and shoulder

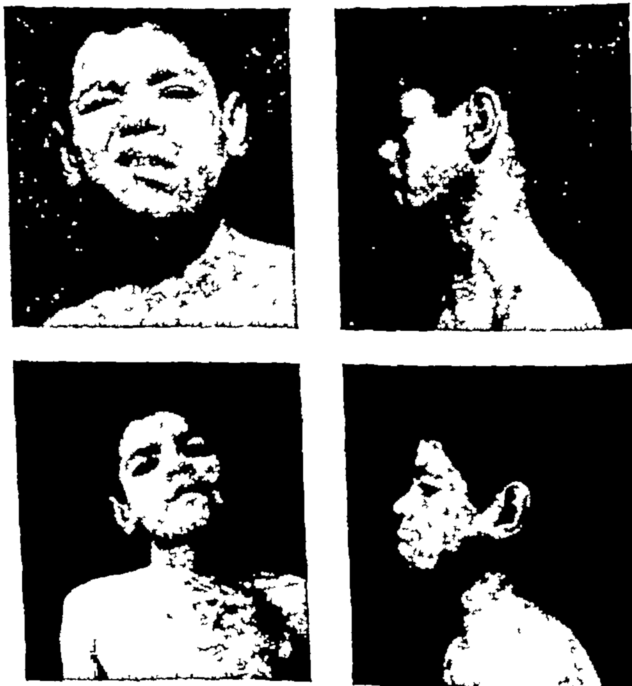


Fig 77



Fig 78

defects replaced by free skin graft The difficulty is that of getting a transverse junction line between the 2 flaps, and which can be overcome by performance of multiple Z-plasty at a later stage Split thickness graft has to be performed too, to create a mandibulo-cervical angle, as in the case shown Numerous operations are thus needed to get a fine cervical contour, which means a long period of hospitalisation

Flaps from a distance These always require several stages and about six months of hospitalisation In an advanced cervical burn contracture, complicated by quadruplegia, due to secondary subluxation of cervical vertebrae and compression quadruplegia, thoracoepigastric tube flap had been used for its repair, besides an upper left Sterno-mastoid sliding operation

Another case, after reconstruction by a tube flap done three years before, developed a median contracture which necessitated free skin grafts at either end of the contracture

It is thus evident that the above techniques have their limitations in the majority of cases The relative success I have achieved after using split thickness graft alone (Fig 79), has led to proposal of a new technique, named "Combination cervicoplasty"

F I. C S , *2 Sherif Pasha El Kebir St , Cairo, Egypt*

A burn contracture of the neck is an entity of its own

It differs from a contracture due to a longitudinal scar in the neck as caused by faulty incision to excise a mass in the neck in the following points

(1) The skin around a burn scar and its bed are also scarred to a lesser or greater degree (Fig 74)

(2) Burn contractures are commonly multiple

(3) Bizarre parallel divergent or convergent neighbouring contractures are noticed.

(4) Chest, face, and axillae are also affected

There is a difference in the etiology between a burn contracture of the neck and burn contractures of other flexor surfaces of the body namely in the antagonistic movement responsible for its development. In contradistinction to the knee region, for example where only flexion and extension are allowed the neck has the following group of movements extension flexion, lateral flexion rotation and movements of mastication deglutition and respiration all of which act in different axes

The normal cervical skin is cosmetically different from other normal or reconstructed cutaneous areas because of its thinness, greater elasticity and presence of underlying platysma

In cervical burns nature overcomes the defect of cervical skin by obliteration of the mandibulo-cervical angle and in extreme cases by complete thoracico-mandibular fibrous union. In the latter cases secondary effects on trachea and spine necessitate urgent functional repair (Fig 75)

From the cosmetic point of view the skin that really matters in the ordinary front view of an individual, is the skin of the posterior triangles and suprasternal part of the neck because the rest is masked by the forward and downward obliquity of the mandible. In the profile view of such an individual the presence of a well defined mandibulo-cervical angle is of greatest importance

The cervicoplastics usually used for burn contractures are Z-plasties local pedicles pedicles from a distance and free grafts.

Z-plasties Proponents of this method have credited it with its ease, and probability of final pleasing cosmetic result if done alone or in combination with partial excision.

My experience with it has led me to the following conclusions

(1) It is suitable for a long single attenuated burn contracture whether carried out as a single z plasty (Fig 76) or as multiple z plasties (Fig 77)

(2) It has to be repeated more than once about every 6 months because however meticulous one may be in excising the scarred bed, other contractures reform taking other direc



Fig 74

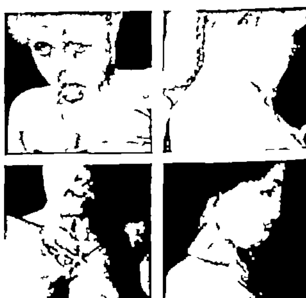


Fig. 75



Fig 80



Fig 81

been discussed and a new technique "Combination cervicoplasty" is proposed

Les Contractures Après Brûlures du Cou. HUSSNI EL SAYED HIGAZI

Une contracture par brûlure du cou constitue une entité en soi Elle diffère d'une contracture due à une cicatrice longitudinale et des contractures consécutives à des brûlures d'autres surfaces de flexion ducorps et cela tant du point de vue etiologique que diagnostique

La partie de la peau du cou qui importe quand on regarde le malade de face est la peau des triangles postérieurs et celle de la région sussternale Vans la vue de profil la présence d'un angle mandibulo-cervical bien dessiné est également importante

Les cervicoplasties telles qu'on les entend habituellement ont leur limite, sans parler de la récidive des contractures du long temps d'hospitalisation nécessaire et des nombreux problèmes techniques soulevés à cette occasion

Les principes de base de la "cervicoplastie combinée" sont les suivants

1 Traiter chaque cas comme un problème séparé

2 Utiliser la peau normale dont on dispose soit par simple avancement, soit par plastie en Z de façon à couvrir les zones interessées du cou dans la vue de face

3 Créer un angle mandibulo-cervical et remplacer tout le tissu cicatriciel par une greffe libre

On a reproché à la greffe libre sa difficulté de prise, sa tendance à la contracture et ses contrastes déplaisants de coloration Aucun de ses inconvénients ne contrebalance les avantages suivants de la cervicoplastie combinée

1 Hospitalisation de brève durée, quatre semaines en moyenne

2 Inutilité d'opération secondaire

3 Résultat fonctionnel parfait avec confrontation de coloration satisfaisante par la suite

Verbrennungskontrakturen des Halses. Eine neue Technik-"Kombinations-Halsplastik." HUSSIN EL SAYED HIGAZI

Eine Verbrennungskontraktur des Halses ist etwas Besonderes Sie unterscheidet sich von Kontrakturen infolge langsgestellter Narben und von Verbrennungskontrakturen an anderen Beugeflachen des Korpers sowohl in ihrer Aetiologie als in ihrer Diagnose

Der Teil der Halshaut, auf den es beim Blick von vorn wirklich ankommt, ist die Haut der hinteren Dreiecke und der Substernalgegend Im Profil ist das Vorhandensein eines gut ausgepragten "Mandibulo-Cervikal-Winkels" von gleicher Bedeutung Die gebrauchlichen Halsplastiken haben ihre Grenzen Rezidive der Kontrakturen, langer Krankenhausaufenthalt und ausserdem verschiedene technische Probleme

Die zugrundeliegenden Prinzipien der "Kombinations-Cervicoplastik" sind

1 Jeden Fall als ein gesondertes Problem anzusehen

2 Verfugbare normale Haut, entweder durch einfache Verschiebeplastik oder Z-Plastik zur

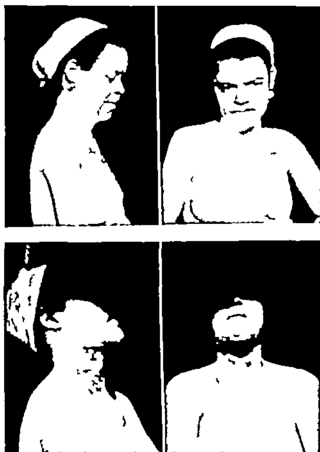


FIG. 79

Combination cervicoplasty Its underlying principles are

(1) To treat each case as a separate problem.

(2) To use available normal cervical skin bordering the scarred area and contractures either by simple advancement, which can in the neck cover a wide defect (Fig. 80) or by the use of Z-plasty and other local flaps to cover the conspicuous area of neck in forward gaze

(3) The creation of mandibulo-cervical angle and replacement of remaining excised scarred bed by free split thickness graft (Fig 81)

Split thickness grafts have been blamed for

(1) Difficulty of take because of deglutition and respiration movements

(2) Liability to contractures

(3) Displeasing colour match

In my experience, with this combination cervicoplasty none of these disadvantages has out weighed the following advantages

(1) The short stay in hospital—average one month.

(2) That no secondary operations are needed.

(3) The good functional result and satisfactory late colour match

A few points in the technique Severe cervical burn contractures form a problem in anaesthesia. This is started under open ether and oxygen inhalation anaesthesia and after restitution of the cervical defect by a transverse incision and excision of scars endo-tracheal anaesthesia is proceeded with. A tracheotomy set should always be at hand in case a mishap should take place at an early stage before intubation.

Excision of all scar tissue might sometimes leave the neurovascular carotid bundle and trachea bare as sternomastoid and pretracheal muscles have to be excised.

No plan of using the normal skin of the neck bordering the defect can be predetermined. The decision is left until after the whole scar is removed and bordering normal skin is undermined. Then an attempt to cover the posterior triangles and suprasternal areas by this normal cervical skin is made using the general principles of plastic surgery in local flap repair

The remaining defect is covered by free skin grafts in the form of transverse sheets under the following conditions

(1) A sandbag is placed behind the shoulders to attain maximal extension of neck.

(2) Dermatome grafts are not used because being invariably broad, they may later due to possible late contracture obliterate the mandibulo-cervical angle.

(3) The suture line of grafts at lateral sides is staggered to circumvent occurrence of late lateral contractures.

(4) More sheets of skin are tailored centrally in between the transverse sheets which are anchored to either lateral end. This is obviously due to the fact that the anterior triangle on hyperextension of neck, has the midline as its longest limb

(5) Sheets covering submental and submaxillary triangle are sutured to the rest of the sheets covering the carotid triangle, at the proper mandibulo-cervical crease.

(6) Plaster of Paris in extension is applied post operatively for 10 days.

CONCLUSION

Cervical burn contractures form an entity of their own as regards etiology diagnosis and *treatment—various known cervicoplasties have*

The pectoralis major, as well as the latissimus dorsi, may become an obstacle resisting reduction of the contracture In the majority of cases, the muscles can be stretched Stretching can be facilitated by separation of some of the fibrosed fibers running within the muscle substance They can easily be palpated, while the arm is held in abduction Incision of the free borders or severance of the insertion of the muscles is rarely necessary

The defect, which is diamond-shaped, is now prepared for skin grafting Hollow spaces, as for instance beneath the pectoral muscle, are obliterated by tacking the free border of the muscle to the axillary fat tissue Vessels and nerves, if exposed, must be covered with surrounding fat tissue From the thick wound edges, a wedge-shaped piece of the dense fibrotic subcutaneous tissue should be excised The now overhanging skin edges are either turned downward and sutured to the base of the wound, or, if they are pliable, they are turned outward and folded over, so that skin comes to lie upon skin The wound edges are held in this position with a few sutures (Fig 83) Blair recommended this procedure for the purpose of increasing the size of the graft bed, to compensate for postoperative contraction

The area is now ready to be grafted The graft of choice is the thick split graft Full thickness grafts have less chance of "take" due to irregularity of the graft bed and difficulty with complete immobilization Preferably, the graft should be removed in one piece It must be sutured carefully to the wound edges and anchored to the bottom of the wound To facilitate this, I found the following steps helpful The graft is first sutured to the anterior wound edges, it is now lifted up and under direct vision the anchoring basting sutures are led through the graft and the depth of the wound This not only facilitates accurate stitching, but avoids injury of such important structures as the vena axillaris Another row of similar sutures may be necessary along the deep posterior boundary of the axilla And, finally, the graft is sutured to the remaining wound edges

The usual pressure dressing is applied after numerous stab holes have been made in the graft The arm is held in abduction by fastening the hand to the head end of the bed and supporting the arm with pillows



Fig 82 (top) Posterior view of patient with a binding web of anterior part of axilla after burn (Center) Condition corrected by double Z-plasty (Bottom) Patient three months after repair

Deckung der beim Blick von vorn auffälligen Bezirke zu verwenden.

3. Den Mandibulo-Cervikal Winkel zu schaffen und alles Narbengewebe durch freie Transplantation zu ersetzen

Der freien Hauttransplantation wurde vorgeworfen schwierige Anheilung, Schrumpfungsneigung und unerfreuliche Farbdifferenzen. Keine dieser Nachteile überwiegen die folgenden Vorteile der "Kombinations-Cervico-Plastik"

1 Kurzer Krankenhausaufenthalt durchschnittlich 4 Wochen.

2 Sekundäroperationen unnötig.

3 Vollkommene funktionelle Ergebnisse und später zufriedenstellende Farbanpassung.

Contracturas Cervicales por Quemadura. HUSNI EL SAYED HIGAZI.

La contractura del cuello por quemadura es una entidad por si misma. Difiere de la contractura debida a cicatriz longitudinal asi como de las contracturas por quemadura de otras superficies de flexión del organismo tanto en etiología como en diagnóstico

La porción de la piel cervical que se aprecia viendolo por adelante es la de los triangulos posteriores y de la región supraesternal en la vista lateral la presencia del angulo mandíbulo-cervical tiene tambien mucha importancia

Las plastias cervicales tienen sus limitaciones, dada la recurrencia de la contractura, la hospitalización larga y los problemas técnicos asociados.

Los principios fundamentales de la "plastia cervical combinada" son

1 Tratar cada caso como un problema separado

2 Uso de toda la piel normal que sea posible ya por simple avance ya por zetaplastía para cubrir las áreas conspicuas de la cara anterior del cuello

3 Creación del angulo mandíbulo-cervical y reemplazo de todo el tejido cicatricial con injerto

Aunque el injerto presenta desventajas en cuanto a su obtención, contracción secundaria y pigmentación ninguna de ellas pesa mas que las ventajas que tiene cuando se usa en la cervicoplastía

1 Estancia corta en el hospital (4 semanas promedio)

2 No se necesitan operaciones secundarias.

3 Resultados funcionales perfectos y coloración satisfactoria en plazo largo

---

Correction of Burn Contractures of the Extremities. HANS MAY M.D *Philadelphia Pa*

Cicatricial burn contractures can be avoided in many instances by early coverage of the raw surface with skin grafts. If for some reason skin grafts cannot be applied or fail to take the contracting forces can be counteracted by proper immobilization of the affected limb If in spite of all these measures a contracture starts developing nothing forcibly should be done to overcome it as for instance by repeated forceful dressings the latter may cause greater production of fibrous tissue through irritation and more shrinkage

If a contracture has developed several procedures or a combination of various procedures are available to overcome it. In contractures due to web formation in which the surrounding skin is pliable one or several Z operations are the method of choice. In contractures due to broad dense scars the latter are incised or excised, the contracture is reduced and the resulting defect is covered either with a skin graft or less often with local or distant flaps. We are indebted to J B Brown for having perfected the technic of skin grafting to such a degree that it has become the method of choice in the majority of contractures where a flap formerly was considered indicated The following examples are picked to discuss the solution of some of the basic problems common in cicatricial contractures.

Axilla Three methods of repair are available. Each one has its special indication

Z-operation The indication for this operation arises when the contracture is due to binding webs and the surrounding skin is pliable. Sometimes the web is so long that it necessitates several Z s (Fig 82) Sometimes the arm is bound to the chest by several webs which all have to be broken up

The use of a graft (Fig 83-85) This method is indicated whenever the scar is broad but vessels or nerves do not need to be exposed or if exposed can be covered by surrounding fat tissue. The contracture is released with a transverse relaxation incision through the entire thickness of the scar Excision of the scar is rarely necessary The incision should not be made through the center of the scar but near the chest wall. This will shift the defect rather toward the chest below the axilla. The arm is now forcibly abducted and all cicatricial bands as they present themselves in the wound are incised or excised. The surgeon soon reaches the vena axillaris. Abduction should now be carried out cautiously Stretching of the vein can be facilitated by ligating and separating some of its branches coming from the chest wall. The other contents of the axilla should not be exposed.



FIG 84 (left) Patient who is 61 years of age, with extensive contracture of the right axilla, as a result of a burn in early childhood In spite of the fact that much of the median surface of the right upper arm was bound to the chest the patient was able to play golf An ulcer developed adjacent to the lower pole of the scar It is visible in this photograph The microscopic examination of this ulcer did not show any evidence of malignant degeneration It was completely excised and the unstable scar covered with a skin graft Subsequently (8 months later), another ulcer developed on the opposite side of the arm Excision of this ulcer revealed a malignant melanoma in unstable scar tissue, necessitating the following steps (center) Wide excision of the unstable scar and ulcers all around the distal half of the right upper arm Wide excision of all scar tissue of median surface of the upper arm and axilla Dissection of all lymph nodes of the axilla and infra-clavicular region Mobilization of local flaps from supra-clavicular area and back to close the exposed nerves and vessels Closure of most of the raw areas with large skin grafts (Right) Six months after the operation Subsequently, patient developed metastases in the chest and succumbed one year and three months later

and either transfer its insertion to a higher position or permit the tendon to retreat It is amazing that the lifting power of the forearm even without biceps function is hardly reduced

Knee joint (Fig 86) The principles in correcting a contracture of the knee joint are similar to those described in previous paragraphs Flaps are rarely needed The relaxation incision is led transversely through the most binding area Care should be taken not to expose the popliteal contents, particularly not the tendons If the contracture cannot be overcome in one stage, the defect is skin grafted, the extremity encased in a plaster cast and one or more similar procedures performed subsequently The first plaster cast should not be changed for at least two weeks unless there is evidence of infection

In this way, most of the contractures, even extensive ones, can be repaired There are however, instances when, although the contractures can be overcome in longitudinal direction, the result is spoiled by a posterior subluxation of the tibia due to shortness of the posterior ligaments O'Donaghue recommends a horizontal and vertical traction to the leg (Fig 86) In extensive cases, however, traction is not successful We have been able to reduce the subluxation, as evidenced clinically and roentgenologically, but as soon as traction was removed the subluxation recurred within a few days Hence, we recommend reducing the subluxation under traction, followed by application of a plaster cast with incorporation of the pins The cast should be applied while the leg is suspended in traction The pins and the anterior half of the cast are removed after two weeks while the posterior half is kept to be applied during the night Active exercises are instituted We found resistance exercises to be particularly valuable, such as active motion of the knee after placing one sandbag beneath the leg and another upon the thigh Walking is also permitted

Hand (Figs 87, 88) The common causes of cicatricial burn contractures of the hand are shrinkage of the skin and fascial structures from prolonged and rigid immobilization of the hand in faulty position The vast majority of these contractures could be avoided by immobilizing the hand in the position of function, namely, cocked-up position of the wrist, midflexion of the metacarpophalangeal and interphalangeal joints and abduction and opposition of the thumb If contractures have developed, the latter should be overcome first by conservative methods in the form of elastic splinting with incorporation of elastic traction, in association



FIG. 83 (top) Contracture of right axilla from old burn scar (Center) Contracture was reduced from a relaxation incision along the chest Lateral wound edge is everted and sutured to the skin of the arm so that skin comes to lie on skin. Metal probe is seen behind the everted skin. This increases the raw surface to counteract a recontracture The defect is covered with large split skin graft. (Bottom) Three months after the operation

The dressing is changed after seven to ten days active exercises should be started after ten days After three weeks, passive motion exercises should be added One of the simplest is exercise on the swing. If, in spite of active and passive exercises the contracture should recur to some degree another skin graft operation should be performed

Variation There are cases of contracture in which a strip of normal, or at least pliable skin is left in the depth of the axilla. In these cases the relaxation incision is not carried through the axilla but along the median border of the pliable skin portion, i.e., along the chest wall (Burton) (Fig 84) If the arm is forcibly abducted, the skin lateral to the incision, partially by dissection partially by pushing it laterally moves upward and is held in the new position with sutures Or it may be turned outward as described above. The remaining defect at the chest wall is skin grafted as described above.

The use of a tube flap (Fig 85) In those cases of extensive contracture in which the binding scar consists of heavy dense fibrous tissue necessitating partial excision of the scar and exposure of vessels and nerves to overcome the contracture without available fat tissue to cover these structures transplantation of a flap for covering the defect becomes indicated. Another indication for the use of a flap is previous failures to correct the contracture by the free graft method. The flap is preferably taken from the neighborhood (chest or back) and, as a rule, needs to be made so long that delayed transfer becomes necessary Occasionally a flap can be rotated from the immediate neighborhood into the defect in one stage and the secondary defect consisting of the original flap bed be skin grafted. Or two flaps may be needed. Davis suggests raising one from front and the other from back, the free ends being sutured together

Elbow joint The underlying principles in repairing flexor contractures of the elbow joint are the same as those for the axilla In extensive contractures however flaps (direct chest flaps) are more often indicated than grafts since wide exposure of the contents of the cubital region and tendon lengthening may be necessary If lengthening of the biceps tendon becomes necessary the Z method should be tried. If this is insufficient to permit complete reduction one should not hesitate to sever the biceps tendon



FIG 86 (top left) Extensve burn of both legs, contracture of both knee joints (Patient referred to author for repair six months after the accident) (Top right) The raw surface was covered with skin grafts and contractures partially reduced Posterior subluxation of the tibia resulting from contracture of the posterior ligaments and capsule Longitudinal and vertical traction to overcome the posterior dislocation Later on a plaster cast was applied in this position with incorporation of wires (Bottom) One year after the operation

2 Burton, T F Surg, Gynec & Obst, 70 938-944, 1940
3 Davis, J S J Bone & Joint Surg, 6 167-187, 1924
4 May, H Reconstructive and Reparative Surgery Philadelphia, F A Davis, Co, 1949
5 O'Donoaghue, D H South M J, 32 1023, 1939
6 Schedel, F Der Chirurg, 23 18, 1952

Correction des Contractures par Brûlure. HANS MAY

On peut faire beaucoup de choses pour contrarier ou diminuer les degrés d'une contracture par brûlure en ayant recours à une immobilisation correcte, en évitant des pansements répétés et pénibles et en procédant à une greffe cutanée précoce Dans le cas où une contracture s'est installée, on dispose de diverses méthodes de cor-

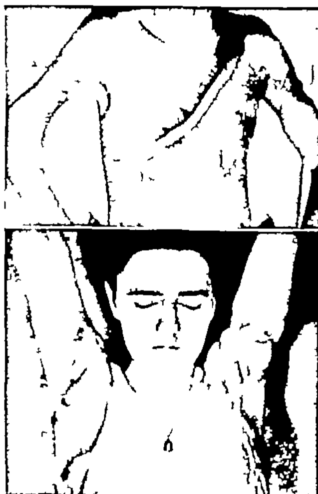


FIG. 85 (top) Contracture of both axillae and right elbow joint from burn Normal skin in the right axilla. From an incision along the median border of the skin in the right axilla (see dotted line) This part of skin was undermined and contracture was reduced The raw surface near the chest was skin grafted A skin graft repair to overcome the contracture of the left axilla was unsuccessful, hence, a tube flap was made from the immediate neighborhood and transplanted in stages to left axilla Contracture of right elbow joint was repaired by a Z-plasty (Bottom) Result four years after the operation.

with occupational or physical therapy more often however surgery must be resorted to Burn contractures of the hand present some of the most difficult problems of reconstructive surgery The difficulties mount with the depth of the scar while in other parts of the body a second degree burn as a rule does not cause any functional damage since epithelium regenerates from the remaining layer of the cutis at the hand, however particularly at the dorsum second degree burns quite frequently are followed by severe contractures from keloid-like scars.

The scar contractures of the skin however is the lesser evil. Much more disastrous are the contractures of the deeper structures namely of fascia, ligaments and tendons. The principle in correcting these contractures consists of excision of the entire cicatricial surface tissue, followed by repair of the contracted fascial structures and closure of the defect with a graft or flap Nowadays with improved technic of skin grafting grafts can more often be used than has been thought possible heretofore. A free graft, however, will not take on naked tendons, bones or joints. Hence, every effort should be made not to expose these structures which is possible in many cases by removing the scar tissue in layers and gradual stretching of the tendons by cross-cutting the covering tissue in numerous places Hand and forearm are immobilized on a sterile well padded wire mesh or aluminum splint. The defect is covered either with a full thickness graft or with a thick split graft If properly removed and applied either one will give good result. The graft is accurately sutured in place and a heavily padded pressure dressing applied The operation is performed with a pneumatic tourniquet applied Dressings and sutures are removed on the tenth postoperative day The splint remains applied, it is discarded three weeks after the operation. Warm saline hand baths are administered daily and active and passive motion exercises are instituted.

SUMMARY

Much can be done to counteract or lessen the degree of burn contractures by proper immobilization avoidance of repeated forceful dressings and by early skin grafting If a contracture has developed various methods of correction are available. A Z operation is the method of choice to break up webbing scars. Contractures due to broad dense scars are repaired by incision or excising the scars, reduction of the contracture, and covering the resulting defect with a skin graft, or less often with a flap Application of these methods is demonstrated in correction of contractures of the axilla elbow joint, knee joint, and hand.

REFERENCES

1 Blair V P., Brown, J B., and Hamm W G Surg Gynec. & Obst., 56 790-798 1933







FIG 89 (top) Extensive third degree burn of dorsum of entire wrist, hand and fingers (Center) The slough was excised on the fourteenth post-operative day Granulations were prepared with Dakin's solution dressings followed by normal saline solution and the area was skin grafted three weeks after the injury Bottom picture depicts the patient's hand two years after the accident

besondere Probleme und Nachuntersuchung sind in der Besprechung eingeschlossen

Correccion de Contracturas por Quemaduras. HANS MAY

Mucho puede hacerse para contrarrestar o disminuír el grado de contractura de la quemadura por medio de una inmovilización adecuada, evitando vendajes vigorosos y repetidos y por la aplicación temprana de injertos Si una contractura se ha desarrollado existen varios métodos posibles de corrección La zetaplastía es el método de elección para corregir las cicatrices fibrosas Las contracturas debidas a cicatrices extensas y fibrosas son reparadas por medio de incisión o excisión de la cicatriz, reducción de la contractura, y cubriendo el defecto resultante con un injerto de piel y menos a menudo con un colgajo La aplicación de éstos métodos se demuestra en la corrección de contracturas del brazo superior, cara anterior del codo, parte posterior de la rodilla y mano Después del tratamiento, se incluyen discusiones sobre problemas especiales y exámenes posteriores

---

The Importance of Early Treatment of the Sequelae of the Burned Hand in Infancy. MIGUEL GRAS-ARTERO, DR, *Plastic Surgery Department, Red Cross Hospital of Barcelona, Spain*

In this paper we wish to express once more the importance of two points in the treatment of the sequelae caused by burns of the hand in infancy

(a) Early operation

(b) Disregard the problem of joint mobility

The case we present is the following Boy, 6 years of age, burned when he was 6 months old, that is a little over five years ago when he fell into the fireplace producing a third degree burn in left hand and mouth, which healed without plastic attention 6 months later The result was a retraction in hyperextension of the index and little finger, chiefly the latter whose nail was adherent to the dorsum of the hand (Fig 90)

In the first operation, three Z plasties were performed on the middle finger and the annular and little finger were freed The resulting raw surface was covered by split grafts The examination of the interphalangeal joint made at this time was discouraging, it seemed impossible to find a solution to the hyperextension

The post-operative treatment consisted of warm baths and a small splint in flexion Three months later the functional recuperation was greatly increased and five months after the operation, complete

Small webs in the interdigital spaces were treated by simple Z plasties (Fig 91)

As a consequence of this experience, we stress



Fig. 87 Method of immobilizing hand after reduction of extensive contracture of palmar and volar sides of hand and fingers. The hand was immobilized on a straight splint Wire traction was applied through the phalanges of each finger The wires were fastened to the end of the splint keeping fingers in extension and abduction The raw surface was skin grafted Photograph depicts hand ten days after operation following removal of first dressing and sutures Graft took well

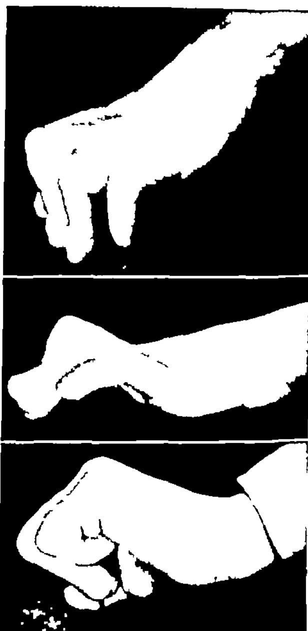


Fig 88 (top) Claw deformity of fingers from burn contracture of dorsum of hand and fingers (Center and bottom) After excision of all scar tissue and removal of the collateral ligaments of the 4th and 5th metacarpophalangeal joints and stretching of the extensor tendons a split thickness graft was applied for closure of the raw surface Pressure dressing applied. Hand immobilized for three weeks. Several months after the operation.

rection L opération en Z est la méthode de choix pour venir à bout de cicatrices en toile d araignée Les contractures duc à des cicatrices larges et denses sont réparées par l incision ou l excision de ces cicatrices par la réduction de la contracture et en recouvrant la perte de substance qui en résulte par une greffe cutanée ou plus rarement avec un lambeau. On montre l application de ces méthodes pour la correction de contracture du bras du coude du genou et de la main. La discussion com porte l exposé des soins postopératoires et celui de problèmes spéciaux et des examens de contrôle ultérieur

Korrektur von Verbrennungskontrakturen. Hans May

Es kann viel getan werden um Verbrennungskontrakturen entgegenzuwirken oder ihren Grad zu verringern durch richtige Ruhigstellung, Vermeidung von wiederholtem groben Verbandwechsel und durch frühe Haut/transplantationen. Falls eine Kontraktur sich gebildet hat, stehen verschiedene Korrektur Methoden zur Verfügung Die Z-Operation ist die Methode der Wahl um Schwimmhautnarben zu brechen. Kontrakturen infolge breiter dichter Narben werden mittels Incision oder Exzision der Nerben Verringerung der Kontraktur und durch Deckung der entstehenden Defekte mit freier Hauttransplantation oder seltener mit einem Hautlappen beseitigt. Die Anwendung dieser Methoden wird durch Korrekturen am Oberarm, Ellenbogengelenk Kniegelenk und der Hand demonstriert. Nachbehandlung.

determinen, y limitarnos a intentar exclusivamente la reparación de la deformidad tegumentaria mediante amplias liberaciones seguidas de injertos, plastias en Z, etc El resultado es practicamente siempre bueno y la recuperación funcional acostumbra a ser completa

Se presenta un caso muy demostrativo

Cervical Contractures. Ivo Pitanguy, M D, *Plastic Department of Santa Casa and Pronto Socorro of Rio de Janeiro, Brazil*

The treatment of the cervical contractures following extensive burns in the neck is a very controversial subject, the results being functionally good and rather unsatisfactory from the esthetical point of view

The best treatment of these deformities should be their prevention by early and adequate skin grafting

When the deformity is mild and local tissues can be used, the Z plastic represents a very good procedure If the contracture is very pronounced the Z should not be used as a unique method One should always remember that doing a Z, we only gain in length what we lose in width The understanding of this principle limits the use of the Z to a very small group of neck contractures

In dissecting the neck to free the contracture, we always resect the platysma, which has been found in most of our severe contractures transformed into a mass of fibrous tissue We have also found that in cases where the contracture is not so pronounced and the platysma is only partially fibrosed, it is responsible for those unsightly fibrous bands so frequently found

In the severe contractures caused by a real destruction of the local tissues, we have been using tissues from other regions We have not been using flaps from the chest or the scapular region, for in most of our cases these regions have also been burned to a certain degree In some of the cases we could have used this procedure, but most of the patients did not want to have scars in such conspicuous areas

Grafts

We limit the use of skin grafts to children or to the cases where local flaps in combination with Z plastic can be properly done, the graft being only part and not the whole procedure





Fig 92 (top) The extension of the contracture and the tube already prepared

Fig 93 (bottom) Second stage The patient has already been grafted and is in the Minerva cast



Fig. 90

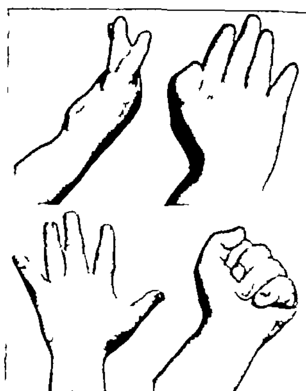


Fig. 91

the need of early operation In spite of the serious deformity of the joints by the mere fact of treating the soft tissue widely removing the scar and free grafting without touching the joints a complete functional recovery can be obtained. We need not worry about later articular limitations

We may affirm therefore, that at this time of life, the *articular problems as sequelae of* burns (so usual in adults) seldom occur even though the morphological deformities of the fingers are seriously discouraging at first sight.

So we believe that the sooner the operation is undertaken the better and quicker will be the results obtained.

L'Importance du Traitement Précoce des Séquelles des Brûlures de la Main Chez le Nourrisson. Miguel Gras-Artero.

Le traitement chirurgical précoce des séquelles des brûlures de la main est très important chez le *nourrisson* à cause des grands avantages qu'il procure. A ce moment de la vie les problèmes articulaires sont presque inexistants. Par conséquent on peut ne pas s'en occuper quelles que soient l'importance et l'extension des déformations. On doit essayer uniquement la réparation des parties molles par un décollement extensif suivi de greffe de plastie en Z etc.

Le résultat est pratiquement toujours bon et d'une façon générale la récupération fonctionnelle est complète

L'auteur présente un cas très typique

Die Wichtigkeit der Frühbehandlung von Verbrennungsfolgen an der Hand im Frühkindalter Miguel Gras-Artero

Die frühe chirurgische Behandlung von Verbrennungsfolgen an der Hand ist im Frühkindalter wegen der hieraus gewonnenen grossen Vorteile sehr wichtig. In diesem Lebensalter exstieren die Gelenkprobleme fast gar nicht und wir können sie infolgedessen unberücksichtigt lassen, ganz gleich wie gross die Schädigung ist. Wir sollten die Wiederherstellung allein der Weichteile durch weitreichende Mobilisierung mit nachfolgender Transplantation, Z-Plastiken usw zu erreichen versuchen.

Die Ergebnisse sind praktisch immer gute und die funktionelle Wiederherstellung gewöhnlich eine vollständige.

Ein sehr typischer *Fall* wird demonstriert.

La Importancia del Tratamiento Precoz de las Secuelas de la Mano Quemada en la Infancia. Miguel Gras-Artero

El tratamiento quirúrgico precoz de las secuelas por quemadura en la mano está indicadísimo en la infancia debido a las grandes ventajas que la misma reporta. En esta época de la vida, puede decirse que los problemas articulares no existen en consecuencia podemos prescindir de los mismos, por grande y aparatosa que sea la deformidad que

one sitting We immobilize the patient with the Minerva-type of cast and wait for three more weeks At the end of three weeks we incise the graft around the mandibulo-cervical angle and dissect until we get a complete extension of the neck The raw area that comes with the neck extension and the resection of the skin-graft between the mandibulo-cervical angle and the sterno-manubrium are covered with the pedicle tube

The results have been satisfactory and durable with no post-operative contractures and with preservation of a practically normal neck line The pictures in the text illustrate better than words the whole procedure

Conclusion

Although we do not think that we are presenting a definite solution for the very severe neck contractures, we think that in our hands the association of a tube and a graft in the way that it was presented has given better and more durable results than with either of the two methods alone Nevertheless, we think that each case should be studied separately, having its specific indication not only from the anatomical findings, but also from an analysis of the various factors involved in each case

Summary

The author has presented a new technique for the treatment of the very severe cervical contractures He has analysed the various methods and suggested that a combination of a tube and a graft would be a good solution for these cases

Contractures Cervicales. Ivo Pitanguy

Le traitement de ces cas donne de bons résultats fonctionnels quand on utilise la méthode convenable

Dans les cas légers, l'auteur a utilisé des tissus locaux en tant que lambeau par rotation ou plastie en Z Des greffes ont été utilisées chez les enfants et chez des malades chez qui une longue période d'hospitalisation ne se trouvait pas indiquée

Dans les contractures très graves la préférence va au pédicule tubulé

Compte tenu de la difficulté d'obtenir un résultat bon et durable à l'aide de greffe dans les contractures graves et aussi les difficultés que l'on rencontre pour obtenir un bon angle mandibulo-cervical avec les greffes tubulées pédiculés, lauteur a préconisé la combinaison d'une greffe et d'un tube pédiculé, la greffe pour l'alignement du menton et le tube pour la région cervicale elle-même

Les résultats ont été satisfaisants et durables sans contracture post-opératoire et conservation d'une ligne cervicale pratiquement normale

Halskontrakturen. Ivo Pitanguy

Die Behandlung dieser Falle bietet gute funktionelle Ergebnisse, wenn die richtige Methode angewandt wird

In den leichteren Fallen haben wir ortsständiges Gewebe in Form von Rotationslappen oder Z-Plastik verwendet Wir haben bei Kindern und Patienten, bei denen ein langer Aufenthalt im Krankenhaus nicht angezeigt war, freie Transplantationen ausgefuhrt Bei sehr schweren Kontrakturen haben wir dem Rundstiellappen den Vorzug gegeben

In Anbetracht der Schwierigkeiten, bei den schweren Kontrakturen ein gutes dauerhaftes Ergebnis mit freien Transplantaten zu erlangen und auch in Hinblick auf die Schwierigkeiten, einen richtigen mandibulo-cervikal Winkel mit dem Rundstiellappen zu erzielen, haben wir eine Kombination von freier Transplantation und Rundstielplastik vorgeschlagen, wobei das freie Transplantat fur die Kinnlinie und der Rundstiellappen fur die Halsregion selbst verwendet wird

Die Ergebnisse waren befriedigend und dauerhaft ohne postoperative Kontrakturen und unter Erhhaltung einer praktisch normalen Halslinie

Contracciones Cervicales. Ivo Pitanguy

El tratamiento de éstos casos ofrece buen resultado funcional cuando se ha usado el método adecuado

En los casos sencillos hemos usado colgajos rotados o zetaplastías Hemos usados injertos en niños y en pacientes en los cuales una larga hospitalización no era indicada

En los casos severos de contractura usamos de preferencia el tubo pediculado

Considerando la dificultad para obtener un resultado bueno y duradero con injertos en las contracturas severas y también la dificultad de obtener un ángulo cérvico mandibular correcto con tubos pediculados, hemos sugerido combinar injertos y tubos El injerto para la barba y el tubo para el cuello

Los resultados son satisfactorios y duraderos sin contracción post-operatoria y quedando practicamente la línea del cuello normal

---

The Repair of Facial Defects Due to Burns. Total Reconstruction of the Face.

Professor Maurice Aubry and Dr Jacques Levignac, *Service O R L*

Using grafts we always make an immobilization with a Minerva type of cast, feeding the patient in the first week with a gastric tube Doing so we try to limit to a minimum the movements of the cervical region.

Tube Pedicles

It has been our experience that in the severe contractures the destruction of the tissues in the cervical regions goes in depth sometimes as far as to the sterno-cleido muscle, thus making it very difficult for a plain graft to fulfil the principle of giving to the region the amount of tissue lost. In our earliest cases we used the classical method of bring an abdominal tube transported by the wrist to the neck The results have been lasting and functionally better than when we used grafts although we observed that it is very difficult to obtain with this procedure a very accurate mandibulo-cervical angle. We have also observed that in the very severe retractions we needed a very wide tube which forced frequent delays making the procedure long and tedious for the patient. In consideration of all these points and also from our experience with Z, grafts and tubes, without any exaggerated enthusiasm for any of those procedures and aiming at giving to its use a specific indication was born the idea of suggesting for the very severe contractures the following method

In the first stage we make an abdominal tube with a width that should be enough to go from the mandibulo-cervical angle to the sternal manubrium Three weeks later we open the contracture and skin-graft the whole defect with a thick graft from the chin to the mandibulo-cervical angle, using a split thickness graft for the rest of the bare area At the same sitting we transfer the abdominal tube to the wrist. In long-standing cases we have observed that there is always a certain amount of postural osteo-arthrosis, making it difficult and painful for the patient to get a complete extension in



Fig. 95 Profile view of the patient



Fig. 94. Third stage Showing the tube on the right wrist partially opened and the defect on the neck resulting from the complete extension and resection of a small part of the graft In our hands we are showing the well-marked mandibulo-cervical angle



Fig. 96 (left) Left profile Two months after the operation showing the very well-marked mandibulo-cervical angle obtained Cosmetic result will be improved by some later additional retouching.

Fig 97 (right) Right profile Two months after the operation showing the very well-marked mandibulo-cervical angle obtained Cosmetic result will be improved by some later additional retouching.

way, for although most of the orbicularis muscle fibres were damaged, some had been spared at the extreme periphery An iridectomy was performed by Dr Morax without success Corneal grafts are planned

3 *Repair of the lips* This was carried out, one after the other, with a full-thickness skin graft taken from the supraclavicular area

4 *Repair of the forehead and nose* The nose was reconstructed with a dorsal skin tube 45 cm long, which was raised and transferred in three stages To attach the tube over the frontal bone, the skin grafts were excised and the frontal sinuses closed by suturing the lining Two months later, the other end of the tube was brought to the nasal aperture The lining of the upper part of the nose was reconstructed with the residual nasal lining and septal mucosa which were sutured together, exposing a raw surface over which the tube end was attached The nasal tip was reconstructed later with the end of the tube which was folded to shape the tip, columella and alae The thick skin of the dorsal tube produced an oversize nose which was reduced to normal size by two secondary procedures An ox cartilage graft was introduced at the second reducing stage to provide support

5 *Repair of the neck* The neck contracture was released by Z-plasty which gave a satisfactory chin and neck line

CONCLUSION

Starting from the initial granulating wound, the face was restored to satisfactory function in 24 months and 15 operations The eyes remain seriously damaged but there is light perception and the lids protect them well The ankylosis of the jaws has been entirely released and incontinence of the mouth corrected The frontal bone is well protected, the nose is satisfactory for function and shape, and the contours, volumes and proportions have been restored in the humanization of the face of this unfortunate person The patient is conscious of people's reactions toward him, but his morale is very good and he is adjusting his social life very satisfactorily

Case 2 A burn destroyed the nose and seriously damaged the upper lip which was repaired with a cervico-thoracic skin tube raised in two stages The nose was repaired with the thoracic end of the tube, the lip with the other end A satisfactory nose and lip were obtained in this way with good color matching (No illustrations available)

Case 2 demonstrates our preference for the cervico-thoracic skin tube in cases of severe but limited facial defects, requiring more than local flaps

CONCLUSION

It can be said that even in the most severely damaged faces due to burns, functions except that of sight can be almost entirely restored Volumes, proportions and harmony of a human face can be restored by reconstructive procedures, so that the individual's readjustment to social life is made much easier

La Réparation Des Brûlures de la Face. La reconstruction totale de la face. M AUBRY ET J LEVIGNAC

Les auteurs présentent deux cas

Dans le ler cas, les auteurs partant d'une destruction complète de la face par brûlure, ont reconstruit celle-ci en 15 interventions sur 24 mois

D'un point de vue fonctionnel, on n'a pu rien d'efficace pour améliorer la vue mais la perception lumineuse persiste et les paupières dont il ne restait que la moitié périphérique de la conjonctive est reconstruite par greffes dermoépidermiques, assurent maintenant une protection efficace

On a libéré la machoire de la sangle fibreuse qui la bloquait et corrigé l'incontinence de l'orifice buccal On a reconstruit la lèvre supérieure par une seule greffe libre de peau totale, prélevée au cou, de même pour la lèvre inf'rieure

On a reconstruit le nez et le front avec un loht tube dorsal La nez est satisfaisant dans sa forme et sa fonction L'os frontal est bien protégé et on a retrouvé le relief correspondant aux arcades orbitaires détruites à ce niveau

Enfin on a retrouvé l'expression On peut dire que les volumes, les contours et les proportions ont été respectés jusqu'a l'humanisation de la face

Le moral du patient est excellent

Dans le second cas, les auteurs montrent leur préférence dans un cas de destruction limitée à la région naso-labiale au lambeau tubulé cervico-thoracique avec lequel ils font une rhinoplastie totale et réparent la lèvre supérieure

Die Wiederherstellung des Gesichts nach Brandwunden. Die totale Wiederherstellung des Gesichts. M AUBRY UND J LEVIGNAC

Die Autoren stellen zwei Fälle vor

Im ersten Fall haben die Autoren nach einer volligen Zerstorung des Gesichts durch Verbrennung dieses in 15 Sitzungen wahrend 24 Monaten wiederhergestellt

de l'Hopital Saint Antoine, Paris, France

We present two cases of facial reconstruction following severe damage by burns

Case 1 (Fig 98) This patient was first seen two months after his accident. The whole face was then a granulating infected wound. The burn had destroyed the forehead skin exposing the damaged outer plate of the frontal bone The trauma also seriously damaged the eyes and the cornea which was widely exposed Of the lids there remained only retracted conjunctivae with no tarsus no rim no lashes. The nose was entirely destroyed The mouth opening was incontinent due to retraction of the lips and the jaws were immobilized in a fibrous ankylosis which allowed only one cm opening The neck wound was healed but there was limitation of movement due to contracture and the chin had no prominence.

Treatment This consisted of

1 *Skin grafting* of the entire face. After cleaning the wound for 10 days with Dakin s solution and Flavazol, all granulations and fibrous tissue were removed so that the grafts could be placed directly over the facial muscles. The desiccated outer plate of the frontal bone was removed down to bleeding bone. The frontal sinuses were widely exposed, for the bone was burned through in this area. The split skin (intermediate) grafts from the thighs took 100 per cent.

2 *Repair of the palpebrae* It was decided to reconstruct the lids to protect the globes because light perception was still present in both eyes. We repaired the eyelids with skin grafts taken from the supraclavicular area The graft was thinned down to one-third thickness over most of the surface, leaving half thickness at the rim and the area nearby The upper eyelids were done first, then the lower Another set of grafts proved to be necessary three months later these being placed at the periphery of the previously repaired area At the first grafting, a blepharorrhaphy was done at each end of the palpebral slit to reduce it permanently to one half We restored satisfactory function in this

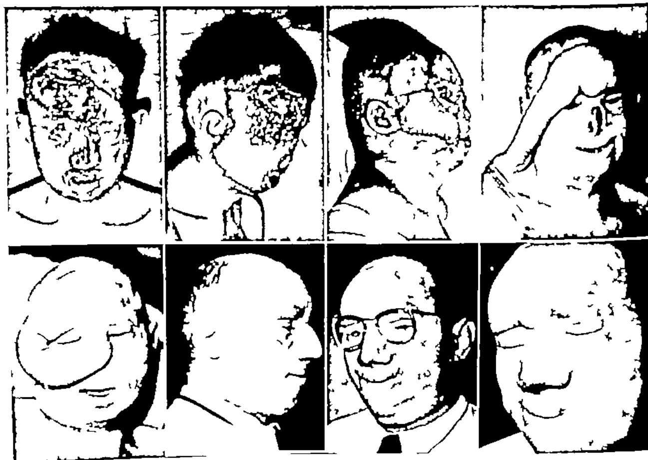


FIG. 98



Fig 99 Front and profile views showing scar contracture of lower lip, chin and neck, following burn by fire

mother, the children found an electric extension cord with a contact plug at each end The patient put the prongs of the plug in the mouth and nose while a companion connected the other end with the current in the socket This contact resulted in burns of the upper lip and nose and double perforation of the palate (Fig 100, bottom)

In a similar case a two year old child (Fig 101, top) placed the live end of an already connected extension cord into the mouth Despite a voltage of only 110 a c an extensive burn of the lower lip resulted, producing complete atresia of the vestibule of the mouth The scarred skin over the mandible was directly attached to the gingiva

In the repair of these typical electric burn injuries of the middle face I believe that the best possible functional and cosmetic results are obtained by use of local surrounding tissues, as the normal innervation and movement of local muscles play such an important part, not possible with the use of tissues brought in from a distance

The following is a description of the repair of an electric burn of the upper lip with perforation of the palate (Fig 100) The lip is first of all freed from adhesions to the maxilla A lining for the palatal perforations is provided by turning over vomer mucosa and the raw surface is then covered with a flap of mucoperiosteum from the palate (Fig 102) After excision of scar tissue in the region of the lip defect, the

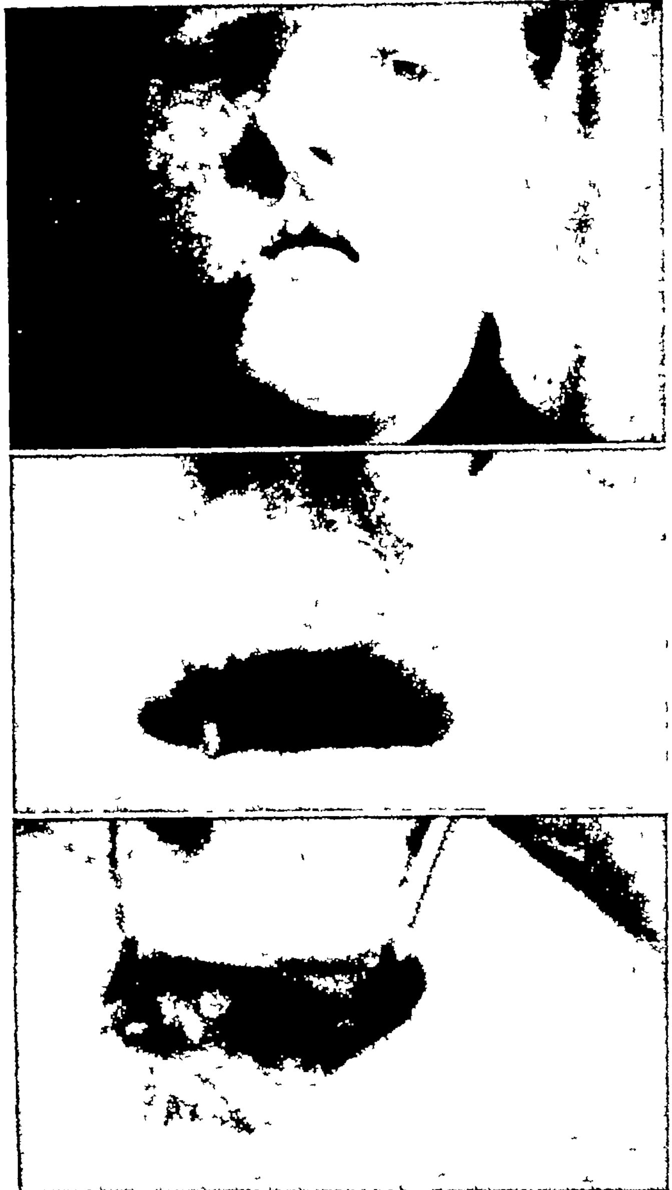


Fig 100 (top and center) Scar contracture of upper lip following electric burn (Bottom) Perforations of palate due to bone necrosis in same case

soft tissues of the cheeks are widely undermined to permit advancement and suture

Figure 101, bottom, shows the final satisfactory cosmetic and functional result in the case of electric burn deformity of the lower lip This was accomplished by extensive undermining, advancement and suture

As a matter of prevention of these deformities it is recommended that a frequent careful check of electric equipment in daily use be made

La Brûlure par Electricité Chez l'Enfant et sa Réparation Plastique. Joachim Gabka

Après une brève introduction comportant des statistiques, l'auteur montre les différences caractéristiques entre une brûlure normale et une brûlure par électricité Du point de vue histo-

Vom funktionellen Standpunkt aus konnte man zur Verbesserung der Sehkraft nichts Wirksames tun, aber ide Lichtperzeption blieb erhalten und die Lider von denen nur mehr die periphere Hälfte der Conjunktiva übrig war wurden durch Haut-Epidermis-Transplantate wiederhergestellt und gewähren jetzt einen wirksamen Schutz.

Der Kiefer wurde von dem fibrösen Strang befreit der ihn festlegte die Inkontinenz der Mundöffnung wurde beseitigt. Die Oberlippe *wurde durch ein einziges freies Hauttransplantat* wiederhergestellt, das—ebenso wie für die Unterlippe—vom Hals genommen war

Nase and Stirn wurden durch einen langen dorsalen Rundstiellappen Schlauch wiederhergestellt Die Nase befriedigt nach Form und Funktion. Das Stirnbein ist gut geschützt und das entsprechende Relief wurde an den Orbitalwülsten die bis auf dieses Niveau zerstört waren wiederhergestellt.

Endlich wurden die Gesichtszüge hergestellt. Man kann sagen daß auf die Massenverteilung die Konturen und die Proportionen soweit geachtet wurde bis ein menschliches Gesicht resultierte

Die Stimmung des Patienten ist ausgezeichnet.

Im zweiten Fall zeigen die Autoren bei einem Fall begrenzter Zerstörung der Nasolabialgegend *wie sie dem Hals-Brust Rundstiellappen mit dem* sie eine totale Rhinoplastik machen und die Oberlippe wiederherstellen, den Vorzug geben

La Reparación de las Quemaduras de la Cara. La reconstrucción total de la cara. M Aubry y J Lavignac.

Los autores presentan dos casos

En el primer caso tratan una destrucción completa de la cara por quemadura haciendo la reconstrucción en 15 operaciones en un período de 24 meses

Desde el punto de vista funcional no se puede hacer gran cosa para mejorar la visión pero persiste la percepción luminosa y los párpados, de los cuales no restaba mas que la mitad periférica con su conjuntiva has sido reconstruídos con injertos dermo-epidérmicos asegurandose una protección eficaz

Se ha liberado la boca de la masa fibrosa que la bloqueaba corrigiéndose la incontinencia del orificio bucal. Se ha reconstruído el labio superior con un solo injerto de piel de espesor completo tomado del cuello haciendose otro tanto para el labio inferior

Se ha reconstruído la nariz y la frente con un colgajo tubular dorsal largo La nariz es satisfactoría en su *forma y función El hueso frontal esta* bien protegido y se encuentra otra vez el relieve correspondiente a los arcos orbitarios, destruídos a este nivel.

En fin se ha dado otra vez expresión Se puede decir que las prominencias los contornos y las proporciones se han respetado hasta hacer humana la cara.

La moral del paciente es excelente.

En el segundo caso los autores muestran su preferencia en un caso de destrucción limitada de la región nasolabial. Mediante un colgajo tubular cervico-torácico efectuaron una rinoplastia total y repararon el labio superior

---

The Electric Burn in Childhood and Its Repair

Joachim Gabka, Dr med., *Romerweg 81, Berlin Karlshorst, Germany*

In the few minutes at my disposal for discussion of the electric burn in childhood and its plastic repair I would like to say first that electric accidents—contrary to traffic accidents—have been greatly reduced in consequence of protective measures recently enacted by different states Unfortunately however it cannot be said that electric burns have been completely abolished by this legislation. Latest statistics indeed, indicate a slightly increasing frequency of accidents due to electric energy Histories of these burns of the middle face indicate that children are especially prone to be the victims due either to carelessness on the part of the children or neglect of surveillance by adults

Demonstration of a characteristic distinction between a burn due to fire and one caused by electricity is important Histologically they are the same Clinically however there is a distinct contrast which manifests itself even in the acute stage and is especially important from the standpoint of plastic repair While an ordinary burn usually involves large surfaces dependent often upon the type of clothing worn the low frequency electric current generally produces a circumscribed but deeply destructive process often involving the underlying bone

This clinical difference is well illustrated by the two following cases.

Figure 99 shows a baby who at the age of 1 year pulled down a wax candle burning on the table, setting fire to the clothing. This caused an extensive surface burn resulting in ectropion of the lower lip and burn scars in the area of both cheeks and the left ear with cicatricial contractures of the neck, impeding movement of the head.

In contrast to the above, the following case (Fig 100 top and center) shows changes limited to the area of the upper lip and nose. This deformity was due to an electric burn with the following history In the absence of the

von typischen Fallen besprochen und durch Diapositive erganzt Abschließend werden die Eltern ermahnt, die im taglichen Umgang gebrauchten elektrischen Anlagen gelegentlich revidieren zu lassen

La Quemadura Eléctrica en los Niños y su Reparación. JOACHIM GABKA

Despues de algunas palabras de introducción que incluyen datos estadísticos, se demuestran las características de distinción entre una quemadura comun y la debida a electricidad El aspecto histopatológico no difiere de una a otra pero el aspecto clínico y la decisión para la cirugía de reparación sí

En tanto que en la quemadura comun los daños se extienden en superficie, en la de corriente de baja frecuencia se encuentran áreas circunscritas pero profundas de destrucción que pueden llegar aun al hueso subyacente

Al final los padres son prevenidos para salvaguardar y si es necesario hacer la revisión de todas las instalaciones eléctricas en uso

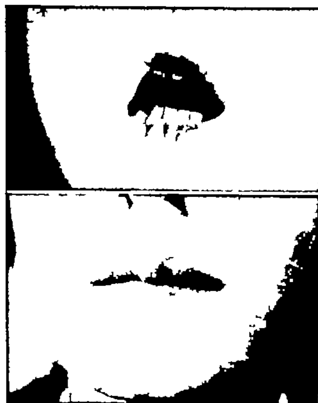


Fig 101 (top) Destruction of lower lip by electric burn. (Bottom) After surgical repair using local tissues.

pathologique les lésions ne diffèrent pas mais du point de vue clinique il y a un contraste très net qui déjà se manifeste à la phase de début et qui joue un rôle décisif dans la réparation plastique Alors qu'un accident normal par brûlure intéresse le plus fréquemment de grandes surfaces, les atteintes quotidiennes par un courant de basse fréquence entraînent le plus fréquemment des processus destructeurs presque circonscrits mais très profonds qui lèsent même les os sous-jacents. Les brûlures électriques chez l enfant avec leur anamnèse typique et dénotant une insouciance continue de la part de l enfant entraînent surtout des déformations des lèvres, du palais et du nez. Les cast typiques et les réparations plastiques sont discutés et présentés à l aide de quelques plaques de projection.

Pour terminer on conseille aux parents de protéger et si nécessaire de faire réviser toutes les installations électriques dont ils ont l emploi.

Die Elektrische Verbrennung im Kindesalter und Ihre Plastische Versorgung JOACHIM GABKA

Nach einführenden Worten, die sich auf Unfallschutzbestimmungen und statistische Angaben beziehen, wird der charakteristische Unterschied zwischen einer normalen und einer elektrischen Verbrennung dargestellt. In pathohistologischer Hinsicht unterscheiden sich die Verletzungen nicht

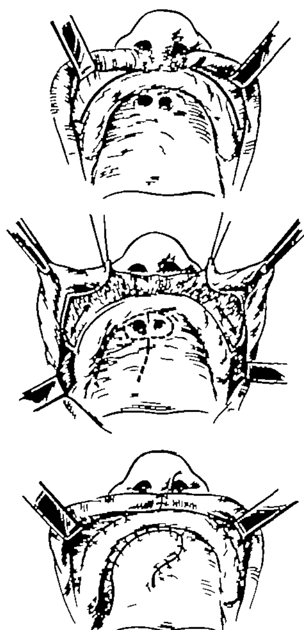


Fig. 102 Illustrating technique of surgical repair of defect of upper lip and perforations in anterior part of hard palate

—in klinischer jedoch ist ein großer Unterschied vorhanden, der besonders im akuten Stadium zutage tritt und späterhin für die plastische Wiederherstellung von Bedeutung ist. Während eine normale Verbrennung oft große Teile der Körperoberfläche befällt finden wir bei den täglichen Stromverletzungen engumschriebene, jedoch tief zerstörende Vorgänge die oft den nahegelegenen Knochen mit betreffen. Die im Kindesalter auftretenden elektrischen Verbrennungen mit ihren bekannten Anamnesen die immer wieder eine große Sorglosigkeit von seiten der Kinder und der Aufsichtsführenden erkennen lassen setzen in der Mehrzahl der Fälle Lippen Gaumen und Nasen defekte Diese Mittelgesichtsverletzungen und ihre plastische Wiederherstellung werden an Hand

TABLE 1

Patients	Relatives	7 nearest groups	
Harelip (+ cleft palate) 498	Harelip (+ cleft palate)	148	among altogether
	Cleft palate alone	7	17327
cleft palate alone 205	Harelip (+ cleft palate)	4	among altogether
	Cleft palate alone	55	7562

gether 703 patients Both patients and affected relatives are divided in the two main groups Harelip (+ cleft palate) and Cleft palate alone The small figure of cleft palate relatives in the harelip group and the small figure of harelip relatives in the cleft palate group clearly proves the genetic independency, the figures being not bigger than could be expected in the case of accidental occurrence And at the same time the big number of harelip (+ cleft palate) relatives in the first group and cleft palate alone in the second group is a proof that heredity must be an important factor, the figures exceeding by far the number we should expect in the case of accidental occurrence

We have another proof of heredity in the results of twin studies, showing a frequency of concordance among monozygotic twins distinctly greater than among dizygotic twins Furthermore the frequency of discordant, monozygotic twins gives some information about the "manifestation" (or penetration) of the gene

By statistical analysis of the frequency figures in the different family groups and examination of the family pedigrees we must presume the most likely manner of inheritance for harelip (+ cleft palate) to be that of so-called "conditioned dominance" with sex-limitation to males and but little manifestation (reduced penetrance) in most genetic milieus, i e the gene occurs generally as a recessive gene, but under favourable conditions also the heterozygotes are manifested

Figure 104 is a typical pedigree of a harelip family, showing the recessive character with bilateral familial disposition and the typical alternation between the light cleft lips and severe cleft lip + palate cases

As regards cleft palate alone it seems to be only hereditary in a rather small number of the cases, and the manner of inheritance is in all likelihood that of simple dominance with failing manifestation and sex-limitation to females

Figure 105 shows a typical pedigree of a cleft palate family with dominant inheritance and

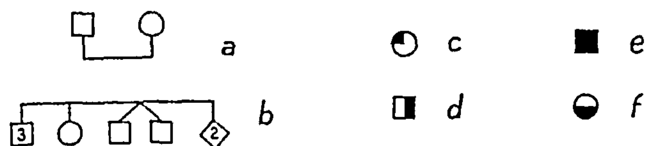


FIG 103 Meaning of symbols used in the pedigrees

a Married couple (male and female without malformations)
b Series of siblings (3 males, 1 female, pair of male twins, 2 of unknown sex)
c Left harelip
d Right harelip + cleft palate
e Double harelip + cleft palate
f Cleft palate alone

several cases of cleft palate in the mother's family but no cleft lips

One apparent exception from the rule of genetic independency of the two cleft groups seems to exist, and that is in the case of accompanying congenital fistula of the lower lip In the literature, f i Sanvenero-Rosselli [10] and Test and Falls [11] as well as among the writer's patients, Fogh-Andersen,[12] there are found a few cases of cleft lip and cleft palate alone in the same family in which fistula of the lower lip

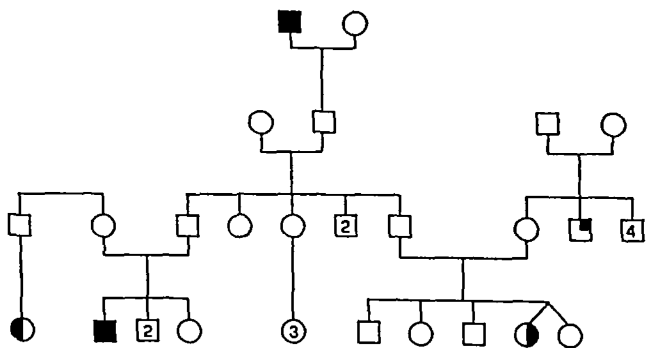


FIG 104 Pedigree of a harelip family

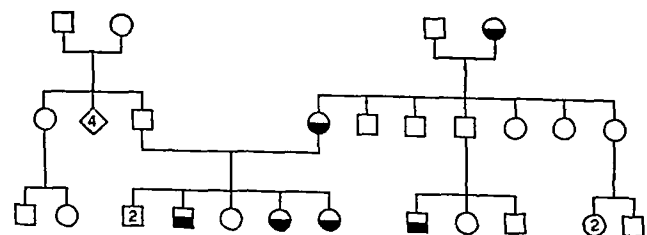


FIG 105 Pedigree of a cleft palate family

II

CLEFT LIP AND PALATE

Remarks on Etiology of Harelip and Cleft Palate with Special Reference to Heredity POUL FOGH ANDERSEN, M. D, *71 Moltkesvej, Copenhagen F, Denmark*

We all know the situation when the parents of a child with cleft lip or palate ask us why this misfortune happened and how big the risk will be for the next child.

With regard to the *embryological development* of the face it is well known that the "classical doctrine of nasal and maxillary processes fusing together was for a very long period accepted unreservedly until comparatively recent investigations brought about some doubt as to this theory Veau[1] and in more recent years Töndury[2] and Stark[3] all think that the cleft lip is a result of an absence of penetration of mesoderm through an epithelial wall a mesodermal deficiency

Turning to the question of the *etiology* of the cleft formations in man which is of great theoretical as well as practical eugenic interest the situation is somewhat different The preceding century presented a great number of various causal possibilities but gradually most investigators adopted the view that a hereditary factor must be an important causal element In laboratory animals genetically as well as environmentally predetermined clefts have been described.

In a monograph published in 1942 I showed[4] on the basis of statistical analysis of 703 Danish families that *the most important etiological* factor in the occurrence of harelip and cleft palate in man must be that of heredity and I set up a series of empirical figures of genetic prognosis

Since then several works have been published most of which confirm my findings but a few recent publications apparently might support the assumption of exogenic factors such as nutritional deficiencies infections or intoxications during pregnancy—e.g Murphy[5] and Gabka[6] In spite of this I still believe that the main factor is that of heredity, and in the following a few instructive tables and pedigrees will be presented.

A figure of fundamental importance is the frequency of these malformations at birth. Previous investigations have shown figures of about 1 per mille or a little more In Denmark the frequency was determined in 1939 by the writer[7] on the basis of a big material of new-born babies from the large lying in departments to be 193 128306 i.e 1 665 or 1.50 per mille. It was shown that the figure is probably representative of the natal frequency in the Danish population and a minimum figure if anything

The deformities are conveniently classified into three main groups (1) Harelip alone, (2) Harelip + cleft palate and (3) Cleft palate alone.

From the Danish family investigation it was possible to show that we have two different malformations with no genetic connections (1) Harelip with or without associated cleft palate most often in males and (2) Cleft palate alone most frequently found in females This peculiar sex-distribution has been confirmed later e.g by Oldfield[8] and by Ivy[9]

In 37 per cent of the cases of harelip with or *without cleft palate and in 19 per cent* of cleft palate alone it was possible to demonstrate cleft formations in the families

Table 1 includes the results of the statistical survey of cleft formations among nearly 25000 relatives in the 7 nearest family groups of alto-

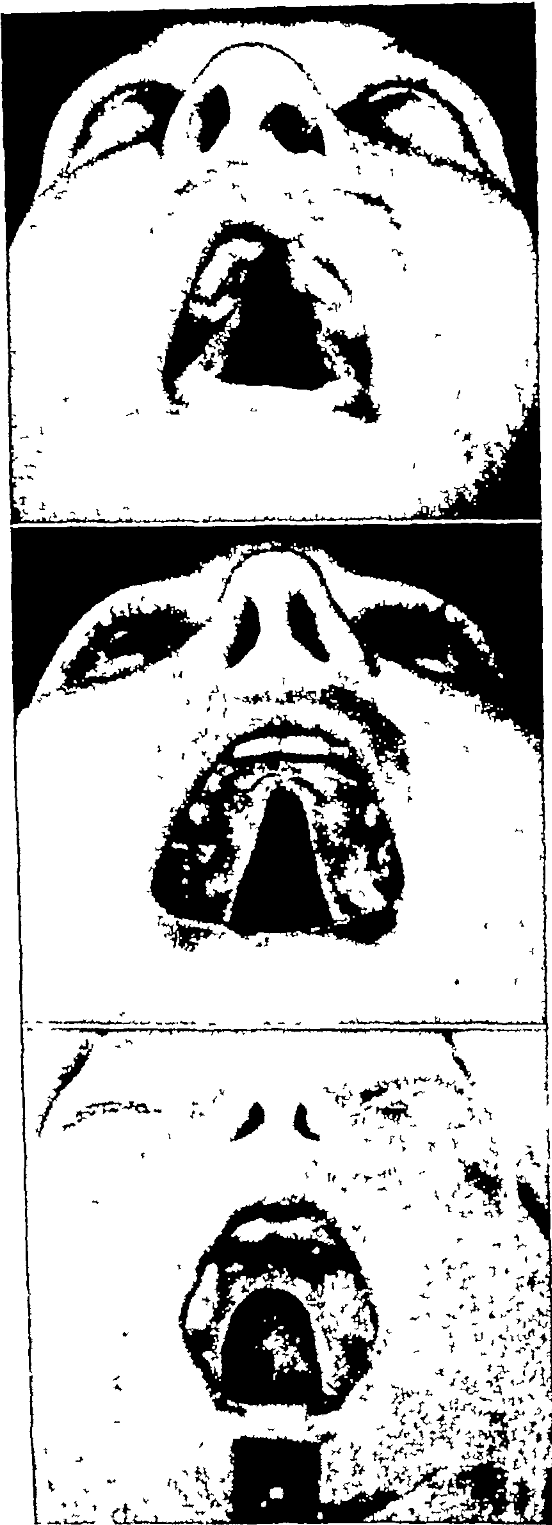


FIG 109 Photographs of patients in pedigree, fig 108 (Top) Father harelip + cleft palate (center) Mother cleft palate (bottom) Child cleft palate

Though of course these 3 cases do not in themselves allow of far-reaching conclusions, they are in full accordance with the advanced theories, and I still believe that we must accept heredity not as the only, but as the most important etiological factor

As regards the *hereditary prognosis,* practically the most important figures, based on the Danish family investigation, are the following If two apparently normal parents have a child with harelip or harelip + cleft palate the chance of deformity in their next child is probably about 5 per cent If one parent has harelip (+ cleft palate) the chance of deformity in the children is only about 2 per cent, but if a deformed child has already been born to them, the chance is raised to about 15 per cent for subsequent children, for which reason the parents are often advised against more pregnancies in those cases

Usually there will be no reason, however, to take any further eugenic measures, except of course that marriage should be advised against if both persons have cleft formations belonging to the same genetic group

Summary

The question of the etiology of harelip and cleft palate, being of great theoretical as well as practical eugenic interest, is still a partially unsolved problem Until recently works on the etiology have been published which apparently might support the assumption of exogenic factors such as nutritional deficiencies, infections, or intoxications during pregnancy

There is still no doubt, however, that the most important etiological factor is that of heredity, as was shown 1942 on the basis of a big Danish patient material of 703 families and statistical survey of the occurrence of cleft formations among altogether 25000 relatives The significance of heredity appears also from twin studies Two different cleft malformations exist with no genetic connection and with a different manner of inheritance, viz (1) harelip with or without associated cleft palate, occurring most often in males, and mostly inherited as a recessive character (so-called "conditioned dominance"), and (2) cleft palate alone, most frequently found in females, only inherited in a smaller number of cases and then as a dominant character with failing manifestation

Family pedigrees and photographs illustrating some instructive cases with cleft formations in both parents are presented

References

1 Veau, V Ztschr f Anat u Entwicklungsgesch, 108 459, 1938

is occurring as a dominant hereditary character Possibly it may be explained as the result of coupling of neighbouring genes

Another interesting observation concerns the patients with other accompanying malformations, constituting about 10 per cent of all cases In the Danish material the "solitary" cases of harelip or cleft palate seemed to be more frequently associated with other malformations than the "hereditary" indicating that the complicated multiple malformations may be due to other "exogenous" causes (disturbances of nutrition? intoxications?) or possibly mutations.

As regards the geographical and the social distribution, the age of the parents and the number of the patients within the series of siblings, and conditions of pregnancy and delivery there did not seem to be any difference from the average, by statistical analysis of the Danish material

How can we give real proof of the correctness of the theories regarding the heredity of uncomplicated harelip and cleft palate? It is very difficult first of all because experimental research in man is impossible in other words we should have a considerable number of marriages with both parents affected From the literature I have been able to find only 3 cases one from England, Cunningham[13] and two from Germany Hinrichsen[14] and Krebs[15] and all of them belong to the harelip group Both parents have harelip or harelip + cleft palate Their children had harelip or harelip + cleft palate, and also perfectly normal children were found, but no cleft palate alone. This is in complete accordance with the theory

Now what would happen if one of the parents had harelip and the other cleft palate alone? In the literature I have not been able to find one single case. As harelip is mostly of a recessive character and cleft palate alone dominant—without genetic connection—we would expect the children in most cases to be quite normal, but a number of cases with the dominant character cleft palate whereas harelip would occur but rarely As briefly mentioned in my monograph[3] I have by chance had occasion to examine no less than three interesting cases of this apparently very rare parental combination in Denmark.

Figure 106 is the pedigree of a family in which the father has harelip + cleft palate and the

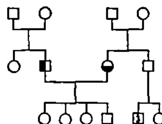


FIG 106 Pedigree of a family in which the father has harelip + cleft palate and the mother cleft palate.

mother cleft palate They have 4 children, completely normal

In Fig. 107 we have a family in which the father has cleft palate and the mother harelip + cleft palate They have one normal daughter and besides the mother has a normal daughter out of wedlock.

The third case (Fig 108-109) is most interesting. A young unmarried house-maid had a broad cleft of the soft and hard palate treated with obturator She had speech therapy at the Danish State Institute for Speech-defects in Copenhagen and here she met a young man with a cleft lip and palate and she became pregnant This of course is not the primary purpose of the centralized social service of speech therapy! The result however was a stillborn boy with a cleft of soft and posterior part of hard palate, but the child's lip was intact.

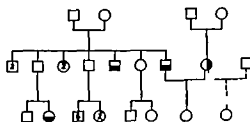


FIG 107 Pedigree of a family in which the father has cleft palate and the mother harelip + cleft palate

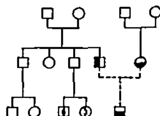


FIG. 108. Pedigree of a stillborn child with cleft palate whose father has harelip + cleft palate and the mother cleft palate.

velop a method that completely satisfies, for as our results improve our standards rise—at best we end up with a scar.

The Gillian principle of looking at each case with "fresh eyes" as if never having seen another like it at least prevents one from getting bogged in the quagmire of routine Certainly not one harelip is identical with another and any clinic that smugly stretches a favorite method to close all unilateral clefts may be asking too much of the method and too little for the patient

There have always been surgeons who favor the conservative straight line closure Such champions as Rose, Thompson and Kilner have shown that if later followed with secondary work the results can be good Yet Blair's modifications of the Mirault triangular flap became popular and with Brown's reduction and simplification the ultimate of this principle was realized With a conservative flap taken from the weak side this technique achieved a closure with only moderate side-to-side tightness but at the price of not coming up with a cupid's bow

Le Mesurier ushered in a new era when he developed the Hagedorn principle of the rectangular flap This had and still has great appeal for it created the resemblance of a cupid's bow but to do this the weak side flap had to be long enough to reach the midline and of sufficient thickness to fill out the bow The sacrifice was in the resultant side-to-side tightness of the lip especially along the free border and most marked in wide clefts Both the Mirault and Hagedorn principles seem fundamentally wrong, for they take a flap from the free border of the weak side and transpose it across to the stronger non-cleft-side In principle this borrows from Peter to pay Paul when Peter is the pauper It was this incongruity that made me finally break from Le Mesurier

We are in a new era which was spearheaded by Tennison's "Z" and soon followed by Cardosa and Marcks' further observations Now I want to get into the act! One thought had been echoing in my mind for some years "Make the strong medial side produce the major flap," but it was not until I was surrounded on all sides by grinning Korean harelips that my method crystallized

I had glanced through Tennison's paper sometime previously but got too tangled in the wires for the method to register There was no access to Cardosa's work and Marcks' paper not being available, I came upon this method independently, guided entirely by Gillies' general principles Now that I look back to Tennison, Cardosa, and Marcks I see some reassuring similarities but also some important differences My variation is more radical but at the same time more economical, it would seem to be more sound in principle and possibly simpler in execution By the cases and their photographs alone can it be decided whether it is more effective If the method produced these results for me in a Korean field camp without the aid of general anesthesia, modern facilities, adequate lighting, and post-operative nursing care, just think what you can do with it!

For a start let's set aside A A′, B B′, C C′, bent wires and other blueprints Caliper addicts may cling to their crutch but as in all art it is usually the freehand "fiddling" that creates the best work.

In my quest for a flap from the strong side I began to focus more closely on this portion of the deformity and became aware that a vestige of ⅔ of a cupid's bow complete with tubercle and white mucocutaneous ridge was invariably present along with a philtrum hollow What has fooled us is that it is pulled into the cleft so as to be almost unrecognizable For those who say "Only God can make a cupid's bow," it might be added that if God gives us a portion of a bow, for his sake, it should be used as such (Fig 110) Now rather than chop into the middle of this normal cupid's bow and philtrum component as in the "Z" plasty methods, why not radically free the entire medial lip element from its



Fig 110 There is 2/3 of a cupid's bow present Let's use it

2. Töndury G Acta Anatomica, 11 300 1950
3 Stark R. B Plast. & Reconstr Surg., 13:20 1954.
4 Fogh Andersen P Inheritance of harelip and cleft palate Copenhagen 1942.
5 Murphy D P Congenital malformations. Philadelphia, 1947
6. Gabka, J Deutsche Zahn Mund-und Kieferheilk, 20 381 1954
7 Fogh Andersen P Ugesk f Laeger 101 1187 1939
8 Oldfield, M C Brit. Journ Surg 37 178 1949
9 Ivy R H. Plast & Reconstr Surg., 9 121, 1952
10 Sanvenero-Rosselli G La divisione congenita del labbro e del palato Rome 1934
11 Test, A. R and Falls H F Journ of Oral Surg., 5 292 1947
12 Fogh Anderson, P Tandlaegebladet, 9 411 1943
13 Cunningham B Journ. Heredity 15:370 1924
14. Hinrichsen R. W Zur Hasenschartenvererbung. Dissertation. Kiel 1935
15 Krebs, H Untersuchungen zur Vererbung der Lippe-Kiefer-Gaumenspalte Berlin 1940

Rémarques sur l'Etiologie du Bec de Lièvre et de la Division Palatine en se Référant Particulièrement a l'Hérédité. POUL FOGH ANDERSEN

La question de l étiologie du bec de lièvre et de la division palatine présentant un grand intérêt théorique aussi bien qu eugénique pratique constitue encore un problème partiellement irrésolu Il y a peu de temps, des travaux sur l étiologie ont été publiés d ou il résulterait qu apparémment interviennent au cours de la grossesse des facteurs exogènes, tels que carance nutritionnelle infection ou intoxication.

Il ne fait pas cependant de toute que le facteur étiologique le plus important est celui de l'hérédité *ainsi que le fait ressortir une étude de 1942 sur* 703 familles danoises et l étude statistique de la survenue de division labio-palatine chez 25.000 parents. Il existe deux malformations des divisions sans connection génétique (1) bec de lièvre avec ou sans division palatine associée et se voyant le plus souvent chez les hommes (2) division palatine seule plus fréquemment rencontrée chez les femmes.

Présentation de pedigrée de famille et de photographies illustrant quelques cas instructifs chez les deux parents.

Bemerkungen zur Ätiologie von Hasenscharten und Gaumenspalten mit besonderem Hinweis auf Erblichkeit. POUL FOGH ANDERSEN

Die Frage der Ätiologie von Lippen und Gaumenspalten, die von großem theoretischen wie auch praktisch-eugenischem Interesse ist, ist immer noch ein teilweise ungelöstes Problem. Bis vor kurzem sind Arbeiten über die Ätiologie veröffentlicht worden, die anscheinend die Annahme exogener Faktoren wie Ernährungsmängel, Infektionen oder Schwangerschafts-Toxikosen stützen.

Es besteht indessen kein Zweifel dass de wichtigste ätiologische Faktor in der Vererbung liegt, wie 1942 an einem grossen dänischen Patientenmaterial von 703 Familien und einem statistischen Überlick über das Vorkommen von Spaltbildungen unter insgesamt 25 000 Verwandten gezeigt wurde Es gibt 2 verschiedene Spaltdeformitäten ohne irgendeinen genetischen Zusammenhang (1) Lippenspalte mit oder ohne Gaumenspalte die am häufigsten beim männlichen Geschlecht vorkommt, (2) isolierte Gaumenspalte die am haufigsten bei weiblichen Personen gefunden wird.

Stammbäume und Fotografien illustrieren einige instruktive Fälle bei denen Spaltbildungen bei beiden Eltern bestehen

Notas de la Etiología de la Fisura Labial y Palatina con Referencia Especial a la Herencia. *POUL FOGH ANDERSEN*

La cuestión de la etiología de la fisura labial y palatina siendo de gran interes eugenético tanto teórico como práctico esta, aun, como un problema parcialmente insoluto A la luz de trabajos recientes, aparentemente se debe a factores exógenos como son deficiencias nutricionales, infecciones o intoxicaciones durante la prefiez

Desde luego que no se duda que el factor mas importante en la etiología es la herencia como se mostró en 1942 en un estudio de *Danish* en 703 familias de la ocurrencia de deformidades por fisura, en un conjunto de 2 500 parientes. Existen dos diferentes malformaciones por fisura sin conexión genética (1) fisura labial con o sin fisura palatina asociada ocurriendo mas en hombres y (2) fisura palatina sola encontrada mas frecuentemente en las mujeres.

Se presentan los árboles genealógicos familiares y fotografías que ilustran algunos casos instructivos *de fisuras, en algunos miembros de esas familias.*

A Primary Camouflage of the Unilateral Harelook D RALPH MILLARD M D *608 DuPont Bldg Miami, Florida*

Back in the 16th century Ambroise Paré labeled the cleft lip deformity "bec de lièvre" and many a surgeon since has tried to camouflage the harelook. The multitude of techniques actually being used today is indication enough that surgeons are still not satisfied. Then, too one cannot help but be impressed at the number of papers being given at this Congress which are devoted to the secondary correction of the harelip deformity It is unlikely we shall ever de-

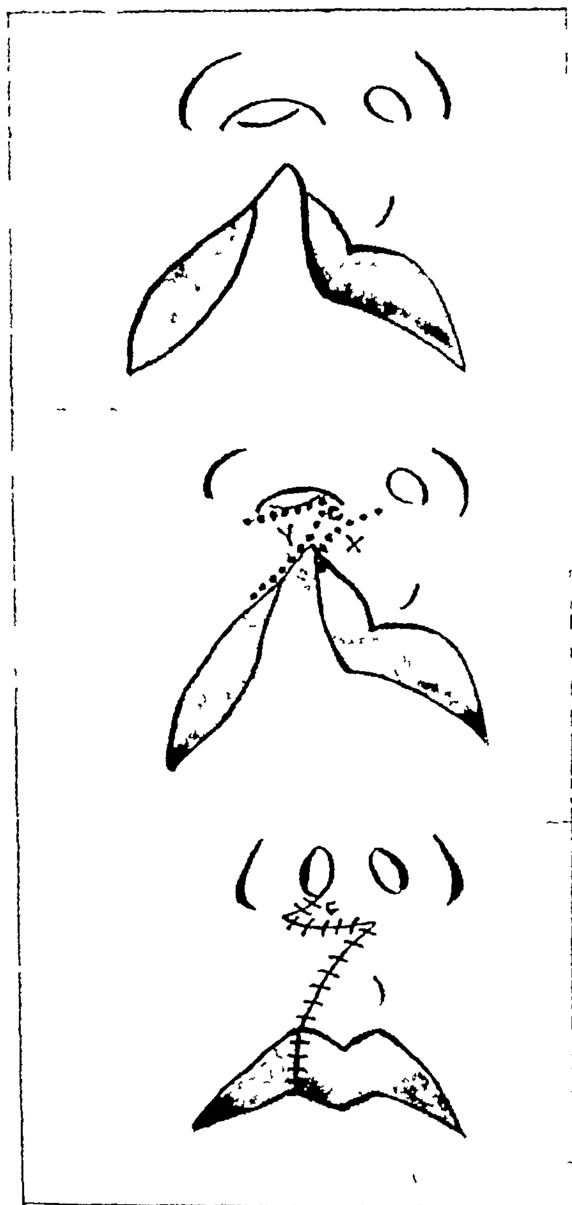


Fig 112 Diagrams for both complete and incomplete unilateral clefts In incomplete clefts use Simonart's Band if it is strong enough

cupid's bow component does not carry a prominent tubercle Then the vermilion flap is used to fill in behind a rotation of local mucosa to make a stronger tubercle For the sake of simplicity no attempt has been made to show these vermilion variations in the diagrams

Now with the advancement of the weak side into the gap above the major rotation, look what also happens The flat alar sagging over the cleft swings in correcting its flair, thus narrowing the abnormally wide nasal floor In the majority of unilateral clefts there is a deviation of the septum away from the cleft which pushes the columella off in the same direction When the small flap (c) based at the columella is brought smartly across to form a nostril sill it also takes up some of the tension of the closure and simultaneously helps to straighten the twisted columella (Fig 113) In some cases to improve the nasal contour further, a small piece of cartilage is grafted to project the tip on the flat side and Kilner's crescentic excision of alar web skin is used to symmetrize the nostrils

By definition a cleft lip is a defect with tissue actually missing It is inevitable that closure will have a relative tension at some point The only place where the lip suffers side-to-side tightness in this method is in the upper portion At this point moderate tension is desirable—first, to reduce the alar flair and bring in the nostril floor and second, the relative tightness in the superior portion of the upper lip gives relative looseness in the lower free border with resultant eversion This allows the relaxed rolling curves of the cupid's bow and enables the lip to pout



Fig 113A Complete cleft with alar flair B 5 days after operation, one day after skin sutures removed C 10 days after surgery

attachment to the nose and rotate it as a whole into its rightful position It is felt that nothing short of incision X, which freshens the strong side cleft along the outside peak of the cupid's bow and swings up under the base of the columella, will adequately tilt this lip entity (Fig. 111) There are several other dividends gained from incision X for not only has the philtrum groove been preserved and the cupid's bow brought into functioning position but its effect has been exaggerated at the actual point of rotation by the formation of a natural bow kink in the free border on one side (vertical arrow) Then too a small flap (c) continuous with the columella has been created which later will turn up to make the nostril sill

The triangular gap left in the wake of the major rotation is to be filled by advancement of the upper portion of the lip element from the weak side It is probably better to begin incision Y with its transverse cut just inferior to the alar base and let it curve slightly downward to facilitate the advancement. The length of this cut is a matter of judgment and is best fashioned by trial and error for each case, being shortest in incomplete clefts When the cleft is incomplete the point of this flap should include as much of Simonart's band as has good muscle body in it, thus conserving what so often is thrown away Every millimeter of useable tissue especially at this point is valuable (Fig 112) With reference to economy it should be noted that in the general plan nothing is discarded except the epithelium necessary to freshen edges In incomplete clefts with a wide nostril floor intact of course a wedge excision is mandatory

Now continue incision Y by freshening along the cleft side which is in fact the free border of the flap The amount of freshening is dependent on two points—first, to produce an edge to match the length of incision X of the opposite side and second, to lift the lateral lip element, which is sometimes too long and fat vertically into an esthetic relationship This does not seem to be achieved as effectively with the regular "Z" When more length is required Y can be and usually is extended at will by cutting back the thinner vermilion along its mucocutaneous junction. This not only carries us to good thick vermilion but produces a turn-back flap of excess vermilion which can be dove-tailed across the cleft behind the lip or interdigitated to bolster the weak side of the cupid's bow Here particularly is where trial and error fiddling will pay off The happiest use I have found for the little red flap has been when the natural

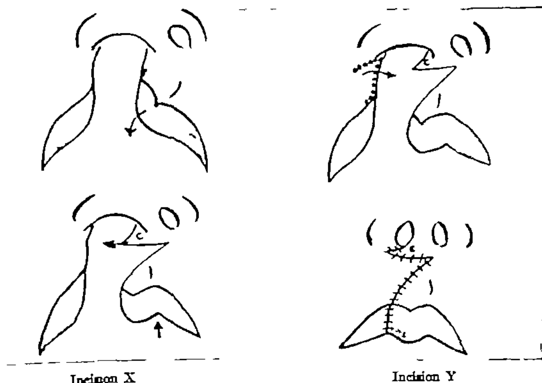


FIG. 111. Diagrams for both complete and incomplete unilateral clefts



FIG 115A Little to no plastic surgery available to the Korean people B Result achieves cupid's bow, philtrum hollow and nostril sill

while the longer limb poses as the oblique ridge of the philtrum The patient has a cupid's bow, a philtrum hollow and a relaxed lip along the free border—when he smiles he really smiles

It has been said often that a natural-looking result following closure of a congenital cleft is a work of art In fact it is a 3-D work of sculptured art Principles, measurements, marks and incisions of a technique can be standardized and a blueprint of the technique memorized Yet the last few millimeters which make all the difference must depend upon the *sculptor* and *his clay*

REFERENCES

1 Gillies, and Millard The principles and art of plastic surgery Little Brown Co, 1956
2 Kilner, T P Personal Communication, 1949
3 Blair, V P, and Brown, J B S G O, 51 81-98, 1930
4 Brown, J B, and McDowell, Frank Plast & Reconst Surg, 5 392, 1950
5 Hagedorn Zentralblatt fur Chirugie, 2 756, 1884, 19 281, 1892
6 Le Mesurier, A B Plast & Reconst Surg, 4 1, 1949
7 Straith, C L Personal Communication, 1950
8 Tennison, C W Plast & Reconst Surg, 9 115, 1952
9 Cardosa, A D Plast & Reconst Surg, 10 92, 1953
10 Marcks, K M, Trevaskis, A E, and Da Costa, A Plast & Reconst Surg, 12 392, 1953

Un Camouflage Primaire du Bec de Lièvre Unilateral. D RALPH MILLARD, JR

La partie non divisée dans les becs de lièvre unilatéraux est porteuse invariablement d'un vestige des deux tiers de l'árc de Cupidon complété par le tubercule et la cavité philtrale Etant donné que ce vestige est simplement en dehors de sa position normale, le temps essentiel dans la réparation du bec de lièvre est de remettre cet élément entier dans sa position normale par une incision qui se recourbe sous le columel, L'incision Y fait ensuite faire une progression au côté externe qui dans les becs de lièvre incomplets doit comprendre la bande de Simonart Quand la pointe de ce lambeau progresse à travers la brèche qui surplombe la rotation primaire, l'aile du nez et le plancher élargi de la narine seront corrigés et le petit lambeau C donnera le sillon narinaire La cicatrice qui résultera de ce "Z" déporté et demi a ses petites branches couvertes par l'ombre nasale alors que sa branche oblique longue apparaît comme un rebord philtral naturel Il faut noter que cela n'a nécessité la suppression d'aucun tissu et que la méthode donne pour résultat un nez plaisant, un rebord labial libre et complètement relaxé avec un arc de Cupidon fortement marqué et une cavité philtrale

Eine Primare Beseitigung ("Tarnung") einseitiger Hasenscharten. D RALPH MILLARD, JR

Die nicht gespaltene Seite bei einseitigen Hasenscharten besitzt stets einen Rest von zwei Drittel des Cupidobogens einschliesslich des Tuberculum

What tension is created in this method takes place over the aveolar bridge and so is splinted from doing the crippling damage that any tightness along the floppy free border can do One word of warning in wide clefts—be certain to undermine the lateral lip element wide enough and make a special effort to get good muscle to muscle approximation at the point of tension

A well balanced lip is formed primarily because the strong medial lip element has been allowed to take over the major part of the construction I have been impressed by the natural looking muscle action Is it the lopsided Z and a half of full thickness flaps that more evenly distributes the balance of muscle pull by juggling the dysplasia of the orbicularis on each side of the cleft? In lips with a major portion of the scar vertical the patient seems to smile on either side of the scar In this method he is forced to smile through it (Fig 114)

Before we discuss the scar that has been formed let's look again at a normal lip and notice how the philtrum ridge on each side of the central groove runs from each peak of the cupid's bow in an oblique curve up and in toward the columella The same effect is achieved with the lopsided "Z and a half whose little zigs run into the nostril sill and under the columella and are hidden in their shadows while the bigger zag curves obliquely down simulating a philtrum ridge and ends ideally at the peak of the bow Any slight contraction at this point would but exaggerate the cupid's bow effect. Please note the philtrum hollow has not been chopped up but maintained in all its naturalness (Fig 115)

The actual quality of the scar itself depends greatly on the individual patient. Tennison turned to the "Z" partly because of keloid in the vertical scar in negro harelips. The Korean is also a keloid maker and the method described evidently zigged enough to escape serious keloiding

In case details have been confusing, quite simply it all boils down to this

1 There is a cupid's bow and philtrum hollow on the strong side of unilateral cleft lips which is merely out of position. Rotate it in its entirety into normal position (incision X)

2. Then fill the gap left in the wake of the rotation with an advancement from the weak side which at the same time serves to swing in the ala narrow the nostril floor and can even lift the entire lateral lip element when it is too long vertically (incision Y)

The scar of this lopsided "Z and a half is camouflaged with two small limbs hidden in the nasal shadow of the nostril sill and columella

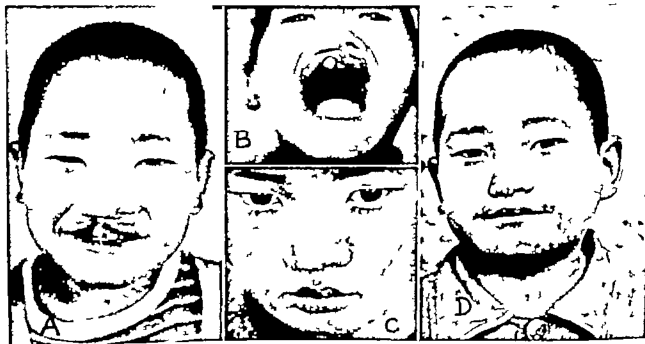


FIG. 114A. Rather wide cleft in spite of Simonart's band B Note extreme nasal deformity C Oblique closure preserves philtrum hollow Note white mucocutaneous ridge and soft curve of cupid's bow D A natural looking smile.

Treatment

Unfortunately we now have a problem at hand Whether it be large or small we must arrive at some decision In order to simplify procedures, we feel that we ought to categorize secondary repair as follows·

1 Lip deformities requiring mild touch-up procedures such as Z-plastics, etc, vermilion-skin adjustments, slight elevations of the nasal floor and skin scar revisions

2 Secondary deformities requiring complete reopening of the lip with advancement of lip elements, elevation of nasal floor, adjustment of base of alar cartilage and columella, closing of labial fistulae, revision of scar deformity by Z-plasty and advancement of mucous membranes by Z-plasty

3 Secondary scar deformities of the lip requiring additional material such as in a flat lip where an Abbé flap might be indicated, or in a full lip where a skin graft would be sufficient

4 Repair of nasal deformities requiring nasal tip repair, rhinoplasties and septoplasties

Lip deformities that require mild touch-up procedures will not be discussed because of the simplicity of procedure involved From our standpoint this group just consists of minor skin-vermilion adjustments or proportionate alar-columella adjustment which can readily be accomplished by Z-plasty or some other similar procedure

Secondary deformities requiring complete reopening of the lip are the usual picture and will represent the average case as presented in the text

The supply of extra material such as is demonstrated in Group II cases is also well illustrated both in the unilateral lip and the bilateral lip (Figs 116-122) Group IV cases or the type of nasal reconstruction that accompanies secondary lip repair is too big a project for this paper and will be discussed in another treatise It is a true fact that a paper on secondary lip repair is incomplete without mention of nasal tip repair but we hope you will bear with us for a short period of time in order for us to accumulate sufficient material to make a future presentation well worthwhile and to give you the benefit of our efforts Be it sufficient for the present to tell you that in our opinion there is no reason for external incisions in the body of the nasal

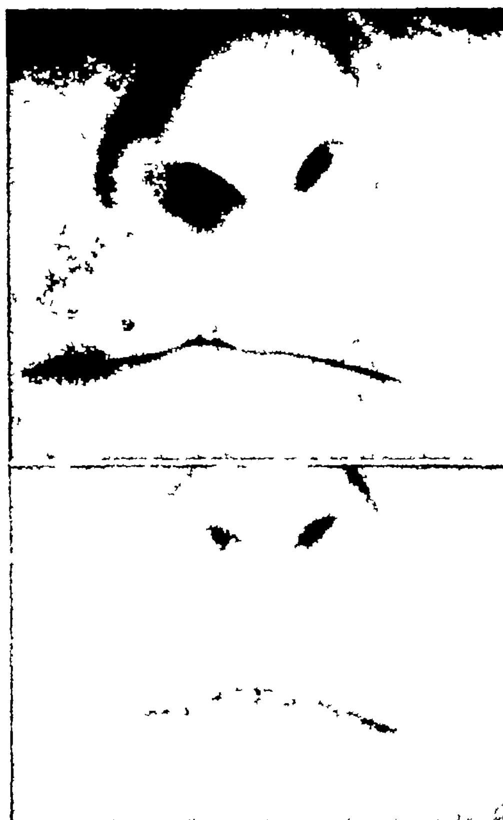


Fig 116 Top shows a mild Group 11 case which required complete reopening because of lack of muscle approximation Bottom shows the repaired lip by a Z-plasty procedure to lengthen lip Note floor of nose

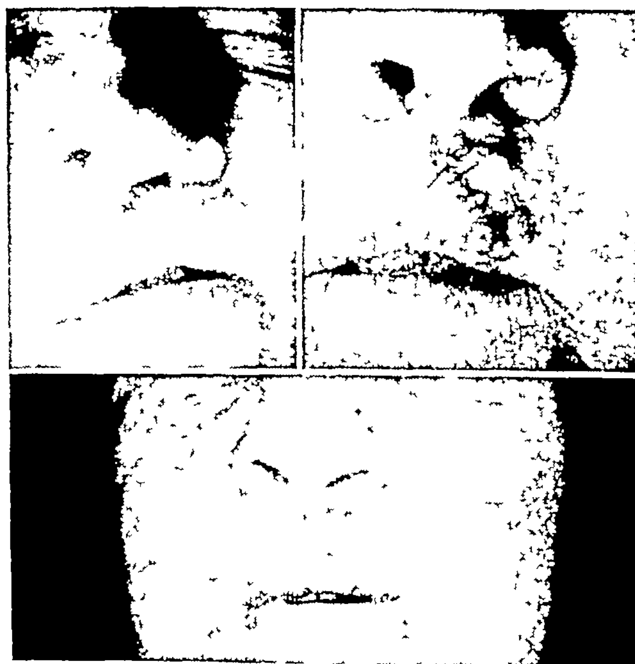


Fig 117 (top left) A frequently encountered lip and nasal distortion following initial repair of unilateral cleft lip (Top right) The intact suture line is shown The size, position or angulation of the flaps of the Z is not standardized It varies with the problems to be met, and the location of existing scars (Bottom) Repair

und des Philtrumgrübchens. Da es sich lediglich in falscher Stellung befindet, besteht der wesentliche Akt bei der Hasenschartenkorrektur in der Drehung dieses ganzen Gebildes in die Normal stellung durch Schnittführung Y, die bogenförmig unter dem häutigen Septum verläuft Die Schnitt führung Y welche bei unvollständigen Spalten das Frenulum labii mit einschliessen sollte ermöglicht dann ein Vorschieben von der lateralen Seite Wenn die Spitze dieses Lappens in die obige Lücke herüberrückt, wird die anfängliche Drehung, das Abstehen des Nasenflügels, korrigiert und der breite Boden des Naseneinganges geschlossen wobei der kleine Lappen C die Schwelle des Naseneinganges bildet. Die entstandene Narbe dieses schiefen ein—einhalb "Z liegt mit seinen kleinen Schenkeln in dem Schatten der Nase ver borgen während der lange Schenkel als eine natürliche Philtrumkante dient. Es ist zu beachten, dass kein Gewebe verlorengegangen ist und dass die Methode eine gefällige Nase, einen völlig entspannten freien Lippenrand mit einem kräf tigen Cupidobogen und Philtrumgrübchen erzielt.

Un Camouflage Primario en los Labios de Aspecto Leporino. D Ralf Millard Jr.

El lado no fisurado de los labios leporinos invariablemente tiene un vestigio de dos terceras parte del arco de cupido completo con el tubérculo y el hueco del filtrum Como se trata simplemente de una mal posicion el paso esencial en la repara ción del labio leporino consiste en rotar el com ponente a su posición normal por la incisión X que se encurva por debajo del subtabique. La incisión Y produce un deslizamiento de la porción lateral que en las fisuras incompletas incorpora la banda de Simonard Cuando el vértice de éste colgajo pasa a través de la muesca arriba de la rotación primaria la concavidad alar y el piso de la naris quedarán corregidos La cicatris resultante de ésta Z irregular tiene sus brazos escondidos en la sombra nasal mientras que surama larga oblicua simula la saliente natural del filtrum

Obsérvese que no se ha eliminado ningun frag mento de tejido y que el método produce una nariz agradable, un borde labial relajado y un buen arco de cupido con el hueco correspondiente al filtrum.

Secondary Cleft Lip Repairs. Kerwin M Marcks M D F A. C S Allan E Trevaskis M D Milton Tuerk M D D D S. and Meredith Payne, M D, *941 Hamilton St Allentown Penna, U S A*

In our association with two Diagnostic Clinics in the State of Pennsylvania, the Lancaster Cleft Palate Clinic at Lancaster Penna. and the Allentown Hospital Clinic at Allentown Penna., we have had the opportunity to see and treat an exceptional number of cases requiring secondary lip repair

Many of these cases offer a challenge to the ingenuity of a plastic surgeon and the standard methods of repair per se frequently described in the literature in the past have to be revamped considerably to fit the occasion. The availability of these methods however has been invaluable in the planning and developing of other techniques and we are grateful for this help

Not all of our procedures are successful but as a rule the majority of patients have received a great deal of relief both mentally and physically by the methods to be described.

Prevention

The whole premise rests with the idea of prevention of secondary lip deformities This is practically impossible since there are usually always some minor or major touch-up procedures necessary later on practically all lips initially repaired by whatever method employed.

Under the circumstances we ought to say that our responsibility in this field of plastic surgery rests with the fact that we should exert every effort to minimize secondary lip repair by enforcing great care and careful planning in the initial repair of a cleft lip

The primary method of repair will not enter into this treatise. Since as we previously mentioned in our article it is not as much the method employed as the one who employs it. This will determine the amount of damage to be repaired at a later date.

Let us assume that we are performing an initial cleft lip repair It takes very little planning to decide what procedure to follow since in our hands we know that the method to be employed will give us what we feel to be a satisfactory repair—but is it really the best we can do? Have we done justice to ourselves by investigating all the recognized procedures in order to determine whether or not we have given this unfortunate individual the best that can be secured. This is a question that can only be answered by ourselves. Pride and prejudice must be eliminated from our nomenclature. Let us be honest with ourselves.

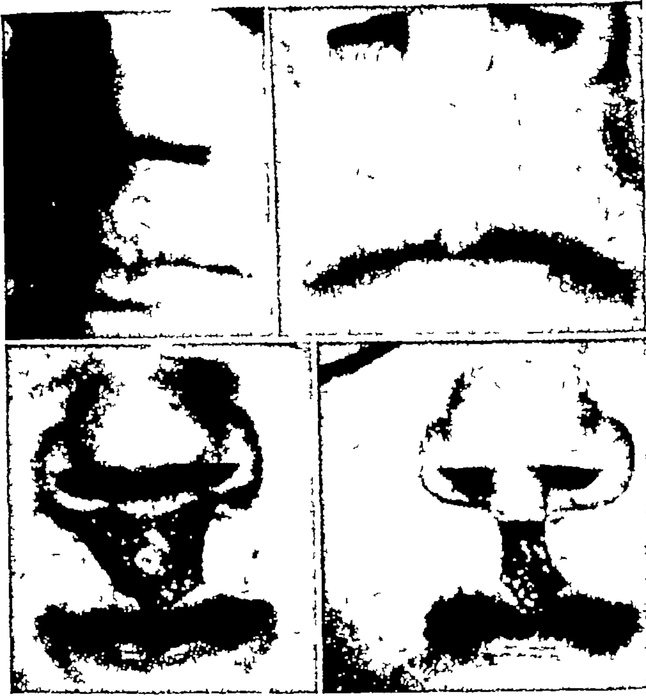


FIG 121 (top left) The heavily scarred lip of a repaired bilateral cleft lip The scar tissue involved skin only making, in our opinion, an Abbé flap unnecessary for the time being This may be ideal as a temporary measure or a permanent measure in women providing the upper lip is not too flat and the lower lip not too redundant (Bottom pictures) The adjustments necessary for the application of a free graft (Top right) The postoperative result Whether this is desirable in men is questionable because of the absence of hair in the graft However, in women it might be well worthwhile

panied by immediate insertion of an already prepared prosthesis (3) Anterior palatal defects with sufficient tissue for surgical closure (4) Labial sulcus fistulae which may or may not accompany anterior palatal defects

This to us is as important an entity in the complete rehabilitation of the patient requiring a secondary lip repair as the methods employed in the initial repair of the cleft lip We might as well accept the fact that without the assistance of this group our efforts are in vain Close coordination between our services will dictate the efficiency required in the over-all care of this type of patient We need all the help we can get so let's bury our differences and go all out to defeat a problem that is to our point of view one of the most perplexing in the field of plastic surgery today



FIG 122 (left) A severe scar deformity of the lip and face following multiple procedures for a bilateral cleft lip deformity (Center) The insertion of an extremely large Abbé flap to replace unusable tissue (Right) The result We realize the lip is quite long A lip shortening procedure has been performed since this photograph was taken Unfortunately these photographs are not as yet available

SUMMARY

We have tried to present some procedures that have been useful in the repair of secondary lip deformities None of them are original in that there have been so many surgeons that have contributed some part, if not all, to the methods described and we wish to take this opportunity to express our appreciation to these pioneers in the field of plastic surgery

We wish to consider this as a personal record and if we have conveyed some little extra thought to the reader, we are all just a little step forward in the rehabilitation of a group of unfortunate individuals

We have dedicated our efforts toward one idea and that is to "Do No Harm" If all of us keep this in mind during the planning of procedures, and during the actual operation, there will exist a great deal more happiness in the lives of families, patients and surgeons

We have a tremendous responsibility so let's carry on in the best tradition of our profession and make a plea for better average harelip repairs similar to the one made by Blair and Brown in 1931

Repair in our series of cases has utilized the principles of Z-plasty practically entirely so let us give credit where credit is due, and more or less admit that as far as we are concerned, without a Z-plasty we would have been doomed to defeat and our efforts worthless The angle varies in each particular case but the principle is the same This has to be decided at the time of operation and as Blair has frequently said, the eye is far more valuable than a pair of calipers

Our deep appreciation to our associates at the Allentown Hospital Cleft Palate Clinic, to Dr

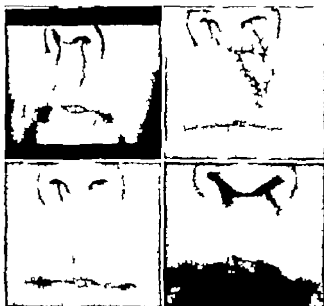


FIG 118 (top left) A relatively unusual type of secondary lip deformity It is ideal for utilization of our usual lip procedure, which preserves the entire muco-cutaneous ridge (Top right) The suture line reveals the transportation of flaps. (Bottom left) The completed lip without make-up is shown. (Bottom right) The lip is shown with make-up applied

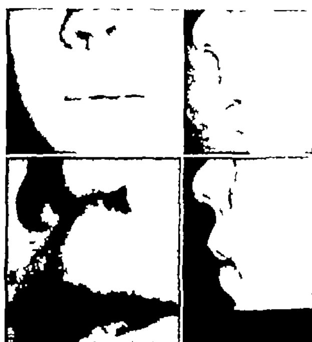


FIG 120 (top pictures) The front and lateral view of a unilateral repaired cleft lip (Bottom pictures) The front and lateral view of the result following the insertion of an Abbé flap Note the protruding upper lip which is the desired effect.



FIG. 119 (top left) A severe bilateral lip deformity with a single previous repair We consider this interesting because this patient went through 42 years with this deformity without additional surgery (Top right) Illustrated is the cooperation necessary with the dental profession. Teeth were extracted, impressions taken and prosthesis constructed prior to surgery (Bottom pictures) The result 28 days after the combined efforts of the dentist, prosthodontist and plastic surgeon

tip to correct the average nasal tip deformity accompanying an old cleft lip repair There are a few exceptions to the rule but the percentage is very small Frequently nasal deformities which always accompany lip defects can be corrected while the patient is undergoing dental care in order to minimize overall length of combined treatment required

Complete Rehabilitation

We have found that coordination with the dentist, orthodontist and prosthodontist is a necessary entity in the satisfactory repair of secondary lip deformities and especially in those cases that have had an alveolar cleft either complete or incomplete. We consider it of such importance that the majority of the cases of this type are not completely surveyed as regards definitive treatment until dental care has been instituted or replacements inserted Exceptions to the rule are (1) Satisfactory teeth alignment where very little dental care is necessary and whatever is essential will not interfere with the cosmetic result of the lip repair (2) Labial sulcus adhesions that are necessary to be released to be done with or without repair of the lip deformity These are frequently accom-

requieren la reapertura completa y movilización de los elementos del labio

3 Cicatrices secundarias deformantes del labio que requieren material adicional tal como el colgajo de Abbe

4 Reparación de deformidades nasales

Hemos encontrado que la coordinación con el dentista, el ortodoncista y el prostodoncista, es necesaria para una reparación satisfactoria de las deformidades secundarias del labio y especialmente en aquéllos casos en que ha existido un paladar alveolar, ya sea completo o incompleto Lo consideramos de tanta importancia que la mayoría de los casos de éste tipo no se consideran totalmente tratados hasta que no ha sido resuelto el problema dental

Las excepciones a ésta regla son (1) Alineamiento dental satisfactorio, (2) Adhesions del surco labial, (3) Defectos del paladar anterior con suficiente tejido para un cierre quirúrgico y (4) Fístulas del surco labial

---

Discussion of the Paper of Kerwin M. Marcks, M. D., "Secondary Cleft Lip Repairs." EDWARD SCHMID, Dr med , *Stuttgart, Germany*

In secondary corrections of unsatisfactory results of cleft lip operations we are often faced with rather difficult problems I will try to show you with the help of a case with broad and unsightly scars how such difficulties can be solved (Fig 123)

At first the upper lip was broadened by means of the usual Abbé flap As a next step the entire skin of the upper lip, including all scar-tissue, was excised and the raw surface was covered with a full-thickness graft from the submental area This procedure has also been satisfactory in men



FIG 123

Nasal Deformity and Single Cleft Lip. LORENZO MIR Y MIR, M D , *Chief Plastic Surgeon, Medical School of Barcelona, Spain*

Experience shows that a great number of bad or mediocre results obtained after surgical intervention of hare lips are due to the nasal ala

The majority of these resulting defects (due, let us say, to technical deficiencies), such as flatness of the ala, low implantation of the external base of the ala, an excess of tissues in the anterointernal portion of the alar border, narrow nasal aperture, etc , may be prevented following the excellent operative technique described minutely among many others by Blair and Brown These authors have insistently remarked upon and stressed the attention which must be given to the correct reconstruction of the nasal ala within the over-all problem presented by the cleft lip In truth, if the incisions are well planned, the tissues of the cheek and nasal ala amply mobilized, a total dissection of the mucous and cutaneous planes effected so as to permit their mutual displacement when reconstructing the position and physiognomy of the ala of the nose, a great number of the above mentioned defects may be prevented Furthermore, as stated by Blair and Brown, the excess of cutaneous tissue (from the external slope of the fissure) resulting after tracing the necessary incisions should not be disregarded, but used in order to reconstruct the floor of the nostril at the end of the operation And, even if some of these defects were not altogether prevented, the remaining traces of nasal deformities can be later corrected with a greater facility than if the initial technique used had not been correct

Nevertheless, there are two defects or sequelae which we have not been able to prevent even when using the best techniques, and they may appear either isolated or together, the backward displacement of the base of external implantation of the nasal ala, and the excessive elevation (with or without angulation) of the middle portion of the alar border of the affected side

When reconstructing a cleft lip and with regard to the nasal ala, three contingencies may occur

(a) That the dissection of the nasal ala and of the cheek be enough to amply mobilize the tissues without having to effect a vertical cut

Herbert Cooper and his associates at the Lancaster Cleft Palate Clinic and to Dr Robert Ivy Chief of the Cleft Palate Division Penna. Department of Health, for their efforts and cooperation in the production of this paper

REFERENCES

1 Blair V P., and Brown, J B A plea for better average harelip repairs Dallas Medical Journal Jan. 1931

2 Blair V P., and Letterman G The role of the switched lower lip flap in upper lip restorations. Plastic and Reconstructive Surgery 5 1 26 1950

3 Brown J B., and McDowell F Plastic surgery of the nose pp 262 288 St. Louis C V Mosby Co., 1951

4 Brown, J B., and McDowell F Secondary repair of cleft lips and their nasal deformities. Annals of Surgery 114 101 117 1941

5 Cannon B The split vermilion bordered lip flap S G & O., 73 95-97 1941

6 Cannon B The use of vermillion bordered flaps in surgery about the mouth. S G O., 74 458-462 1942

7 Davis J S., and Kitlowski E. A. The theory and practical use of Z incision for the relief of scar contractures Annals of Surgery 109 1001 1016 1939

8 Gillies Sir H., and Kilner T P Hare-lip operations for the correction of secondary deformities The Lancet, Dec. 24 1932 p 1369

9 Marcks, K. M., Trevaskis A E., and DaCosta A Further observations in cleft lip repair Plastic and Reconstructive Surgery 12 392 402 1953

10 Smith F Planning the reconstruction. Surgery 15 1 15 1944.

11 Trusler H M and Glanz S Secondary repair of unilateral cleft lip deformity square flap technique. Plastic and Reconstructive Surgery 10 83-91 1952.

Réparations Secondaires de Bec de Lievre. KERWIN M MARCKS ALLAN E TREVASKIS MILTON TURCK ET MEREDITH PAYNE.

Quand on envisage une telle réparation les auteurs en vue de référence ultérieure divisent les procédés envisagés en quatre catégories

1 Déformations labiales nécessitant de petits procédés de retouche tels que plastie en Z etc.

2 Déformations labiales secondaires nécessitant une réouverture complète de la lèvre avec avancement des éléments labiaux, etc

3 Déformations par cicatrices secondaires de la lèvre nécessitant un apport de matériaux neufs tels qu'un lambeau d Abbe.

4 Réparations de déformations nasales.

Les auteurs ont trouvé que pour la réparation des déformations labiales secondaires et particulièrement dans les cas avec palais alvéolaire complet ou incomplet, il est nécessaire de collaborer avec le dentiste l orthodontiste et le prosthodontiste Ils attachent une telle importance à ces conditions que le traitement définitif et complet de la grande majorité des cas n est pas entrepris avant la mise en oeuvre des soins dentaires et la mise en place de prothèse.

Les seules exceptions à cette règle se font dans le cas de (1) Alignement dentaire satisfaisant (2) Adhérences du sillon labial (3) Pertes de substance palatine antérieure avec quantité suffisante de tissu pour une fermeture chirurgicale et (4) Fistules du sillon labial.

Sekundäre Lippenspaltenoperationen. KERWIN M MARCKS, ALLAN E. TREVASKIS, MILTON TURCK UND MEREDITH PAYNE.

Bei der Planung der Plastik teilen wir die in Aussicht genommenen Massnahmen zur späteren Bezugnahme in vier Kategorien ein

1 Lippendeformitäten die eine geringe Verbesserung erfordern, wie Z-Plastik etc.

2 Sekundäre Lippendeformitäten, die eine vollständige Wiedereröffnung der Lippe mit Vorschieben von Lippenbestandteilen etc. erfordern.

3 Sekundäre Narbendeformitäten der Lippe die zusätzliches Material, wie Abbé- Lappen, erforden.

4. Korrekturen von Nasendeformitäten.

Wir haben gefunden, dass Zusammenarbeit mit dem Zahnarzt dem Orthodonten und dem Prothetiker eine notwendiges Sauxes ist für eine zufriedenstellende Korrektur sekundärer Lippendeformitäten, insbesondere in den Fällen, die eine vollständige oder unvollständige Alveolarspalte gehabt haben.

Wir sehen es als sehr wichtig an dass in der Mehrzahl der Fälle dieser Art die endgültige Behandlung nicht überblickt werden kann bevor nicht die Zahnbehandlung stattgefunden hat und der Ersatz eingegliedert worden ist.

Ausnahmen dieser Regel sind (1) befriedigende Zahnstellung, (2) Verwachsungen im labialen Mundvorhof (3) Vordere Gaumendefekte mit genügendem Gewebe für einen chirurgischen Verschluss (4) Fisteln im Mundvorhof

Reparacion Secundaria del Labio Leporino. KERWIN M MARCKS ALLAN E TREVASKIS, MILTON TURCK Y MEREDITH PAYNE.

Al planear la reparación dividimos en cuatro los procedimientos de reparación para referencias futuras.

1. Deformidades del labio que necesitan un levantamiento medio tales como las zetaplastias etc.

2 Deformidades secundarias del labio que

requieren la reapertura completa y movilización de los elementos del labio

3 Cicatrices secundarias deformantes del labio que requieren material adicional tal como el colgajo de Abbe

4 Reparación de deformidades nasales

Hemos encontrado que la coordinación con el dentista, el ortodoncista y el prostodoncista, es necesaria para una reparación satisfactoria de las deformidades secundarias del labio y especialmente en aquéllos casos en que ha existido un paladar alveolar, ya sea completo o incompleto Lo consideramos de tanta importancia que la mayoría de los casos de éste tipo no se consideran totalmente tratados hasta que no ha sido resuelto el problema dental

Las excepciones a ésta regla son (1) Alineamiento dental satisfactorio, (2) Adhesions del surco labial, (3) Defectos del paladar anterior con suficiente tejido para un cierre quirúrgico y (4) Fístulas del surco labial

---

Discussion of the Paper of Kerwin M. Marcks, M. D., "Secondary Cleft Lip Repairs." EDWARD SCHMID, Dr med, *Stuttgart, Germany*

In secondary corrections of unsatisfactory results of cleft lip operations we are often faced with rather difficult problems I will try to show you with the help of a case with broad and unsightly scars how such difficulties can be solved (Fig 123)

At first the upper lip was broadened by means of the usual Abbé flap As a next step the entire skin of the upper lip, including all scar-tissue, was excised and the raw surface was covered with a full-thickness graft from the submental area This procedure has also been satisfactory in men



FIG 123

Nasal Deformity and Single Cleft Lip. LORENZO MIR Y MIR, M D, *Chief Plastic Surgeon, Medical School of Barcelona, Spain*

Experience shows that a great number of bad or mediocre results obtained after surgical intervention of hare lips are due to the nasal ala

The majority of these resulting defects (due, let us say, to technical deficiencies), such as flatness of the ala, low implantation of the external base of the ala, an excess of tissues in the anterointernal portion of the alar border, narrow nasal aperture, etc, may be prevented following the excellent operative technique described minutely among many others by Blair and Brown These authors have insistently remarked upon and stressed the attention which must be given to the correct reconstruction of the nasal ala within the over-all problem presented by the cleft lip In truth, if the incisions are well planned, the tissues of the cheek and nasal ala amply mobilized, a total dissection of the mucous and cutaneous planes effected so as to permit their mutual displacement when reconstructing the position and physiognomy of the ala of the nose, a great number of the above mentioned defects may be prevented Furthermore, as stated by Blair and Brown, the excess of cutaneous tissue (from the external slope of the fissure) resulting after tracing the necessary incisions should not be disregarded, but used in order to reconstruct the floor of the nostril at the end of the operation And, even if some of these defects were not altogether prevented, the remaining traces of nasal deformities can be later corrected with a greater facility than if the initial technique used had not been correct

Nevertheless, there are two defects or sequelae which we have not been able to prevent even when using the best techniques, and they may appear either isolated or together, the backward displacement of the base of external implantation of the nasal ala, and the excessive elevation (with or without angulation) of the middle portion of the alar border of the affected side

When reconstructing a cleft lip and with regard to the nasal ala, three contingencies may occur

(a) That the dissection of the nasal ala and of the cheek be enough to amply mobilize the tissues without having to effect a vertical cut

(débridement) in the external nasal mucous tissue in front of the inferior turbinate. The above mentioned sequelae do not appear in this case.

(b) That it be necessary to effect a vertical section of the nasal lining as stated above, in order to obtain an ample mobilization of the tissues of the lip and cheek. In this case a tendency toward a backward displacement (retraction) of the whole zone of implantation of the corrected nasal ala usually appears This retraction may many times be noticed on sight, marring the esthetic result of the intervention but even in cases where this deformity is not noticeable the retraction of the tissues at a level with the implantation of the ala may become manifest when trying to pull forward the nasal ala of the reconstructed side

(c) In the cases of a wide fissure where the mobilization must be greater and also therefore more extensive the mucous débridement of the side wall of the nose the defect usually appears with its double appearance of angulated elevation of the middle portion of the alar border and pronounced sinking of the nasogenian cutaneous groove which limits the nasal ala

PATHOGENESIS

These sequelae which we have mentioned are in our opinion the outward expression of the internal process of cicatrization The cause is the logical scar retraction suffered by raw zones not covered by epithelial or mucous tissue.

After the section and débridement of the lining (and the ample mobilization of the affected tissues) on the lateral wall of the nose immediately behind the reconstructed nasal vestibule, there remains a zone of a more or less triangular shape with an inferior base not covered by mucous tissue. As these tissues are soft and, therefore moveable, the scarring and healing of this raw exposed area is essentially effected by contraction of the wound (not by epithelization of the lining) and this is externally manifested by the morphological defects.

We have verified that the defect in its most pronounced form, usually presents itself in adults or in babies operated on after the first few months of life. We believe that this may be due to the fact observed by Marino that in precociously operated patients, the cartilage of the ala is not well defined and has not, therefore been morphologically affected by the congenital deformity

TREATMENT

Following Blair and Brown we make use of the cutaneous tissues left over from the design of the incisions in order to reconstruct the floor of the nostril Now then we attach as much, or more importance if possible to the mucous part of these superfluous tissues. We use it completely, and it serves to cover the raw area resulting in the mucous surface of the lateral nasal wall behind the corresponding nasal ala The *technique* which we propose and use in order to prevent these sequelae is as follows

When we effect the incision of the design with the point of the scalpel, we place the scalpel slightly sideways, so that the wound of the lining is more lateral than the cutaneous wound in this way the excess of lining will be slightly larger than with the usual method. When the ample mobilization of the tissues of the ala and the cheek has been effected, and the required débridement of the nasal lining in front of the inferior turbinate accomplished, we incise in two the mucous cutaneous flap above mentioned, and effecting a backward and upward rotation of the lining flap we suture it and apply it to the raw gap in the lateral wall of the nose at the entrance to the nasal cavity We then follow the usual Blair and Brown technique.

SUMMARY

The author believes that after the operation of simple hare lip the defects or sequelae concerning the nasal ala most difficult to prevent with the habitual techniques are the ulterior backward movement of the external base of implantation of the ala of the nose, and the elevation and angulation of the middle portion of the alar border

The cause of these defects is the internal scar retraction due to the contraction of a residual mucous wound which is left to heal by itself This wound resulting from a debridement effected in order to permit a greater mobilization is found behind the nasal ala and in front of the inferior turbinate

The author presents a change in the usual technique which consists of closing this wound during the operation to prevent in this way a

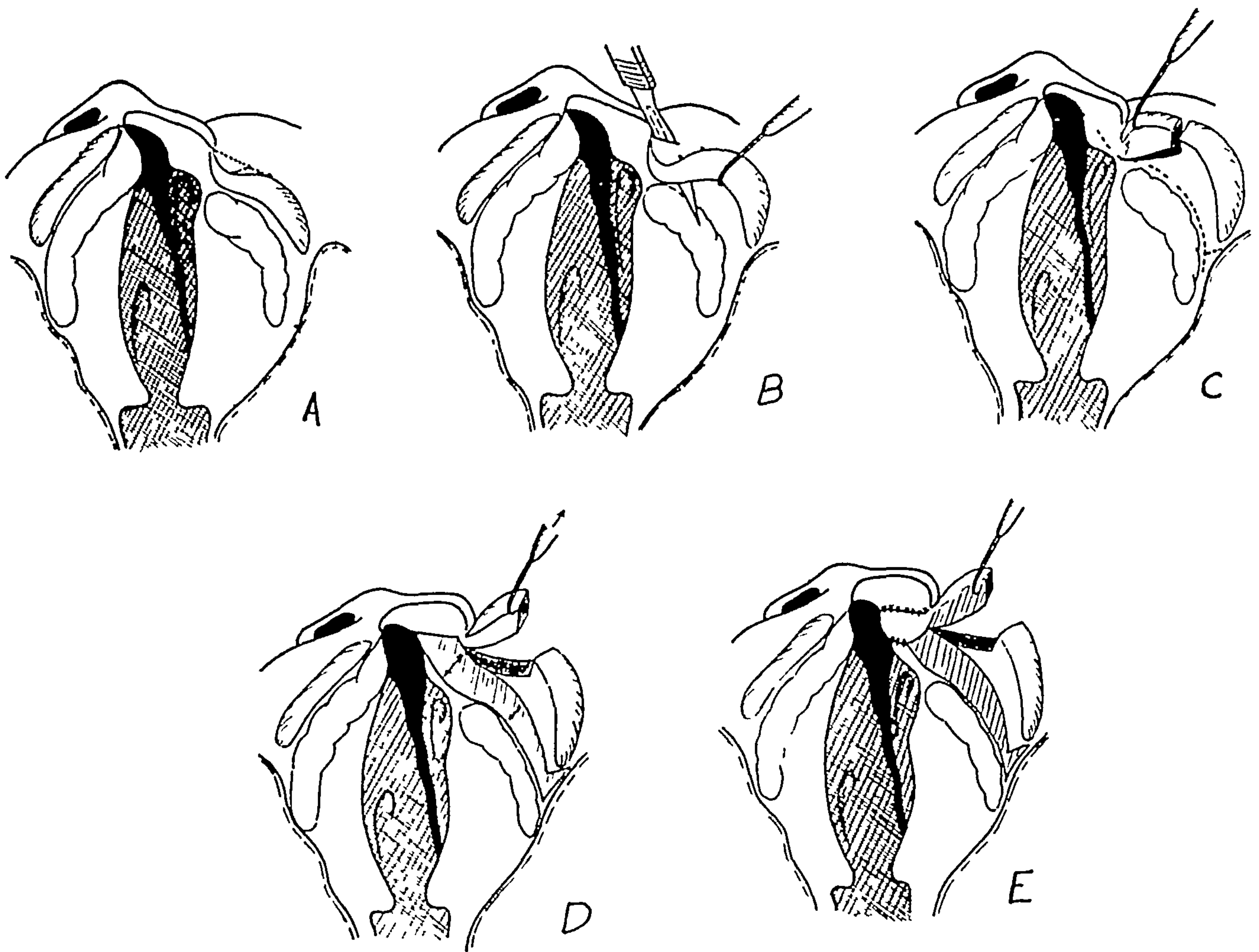


FIG 124 Drawing of the technique recommended in order to prevent the final retraction of the base of implantation of the nasal ala of the affected side

A, B, C Tracing of the incisions following the technique of MIRAULT-BLAIR The incision in the gingival groove is continued upwards in the lateral nasal lining in front of the inferior turbinate

D, E The raw surface resulting from the former debridement is covered by means of a mucous flap taken from the excess of tissues disregarded by the tracing of the incisions

later retraction of this area In order to do this he makes use of the mucous zone discarded by the tracing of the incisions in the external slope of the fissure

REFERENCES

1 Blair, J P, and Brown, J B Surg Gyn & Obst, 51 81, 1930

2 Brown, J B, and McDowell, F Surg, Gyn & Obst, 80 12, 1945

3 Marino, H Labio leporino (2nd Latin-American Congress), 1942

Déformations Nasales et Bec de Lievre Unilateral. LORENZO MIR Y MIR

Deux malformations ne peuvent pas être corrigées par les méthodes habituelles le déplacement en arrière de la base de l'aile du nez et la déformation (angulation) de la partie moyenne du rebord alaire Elle représente le processus de guérison interne et existe dans les cas où il est nécessaire d'inciser verticalement (débridement) le recouvrement latéral du nez au niveau du cornet inférieur Il persiste alors une surface rugueuse à base inférieure qui étant faite de tissu mou sans aucune résistance guérit principalement par contraction

En appliquant la technique de Blair-Brown et en utilisant un bistouri très pointu, l'auteur incise de façon à obtenir un excès de revêtement Quand il a effectué une ample mobilisation dutissu et un débridement muqueux latéro-nasal, l'auteur coupe en deux l'excédent du lambeau de recouvrement cutané Effectuant alors une rotation en haut et en arrière du lambeau de recouvrement, ills suture et l'applique sur la perte de substance nasale latérale, ce qui empêche toute progression ultérieure

Nasendeformitat und einseitige Lippenspalte. LORENZO MIR Y MIR

Es gibt zwei Defekte, die mit den gewohnlichen Methoden nicht korrigiert werden konnen die

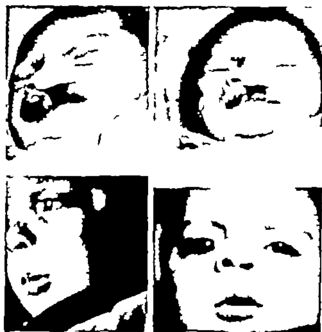


Fig. 125 Patient operated 24 hours after birth following the above mentioned technique

Rückverlagerung des Nasenflügelansatzes und die Deformität (Abknickung) des mittleren Teiles des Nasenflügelrandes Sie sind der Ausdruck des inneren Heilungsprozesses und sind in solchen Fällen vorhanden wo es notwendig war die laterale Auskleidung der Nase von der Unter Muschel senkrecht zu durchtrennen (Mobilisierung) Es verbleibt dann eine Wundfläche an der Unterseite die da sie aus weichem keine Resistenz bietenden Gewebe besteht grundsätzlich unter Kontraktur heilt

Unter Benutzung der Blair Browne'schen Methode und unter Verwendung eines spitzen Skalpells schneiden wir so dass wir einen Überschuss von Auskleidungsmaterial erhalten. Wenn die ausgiebige Mobilisation des Gewebes und die Ablösung der seitlichen nasalen Schleimhaut er

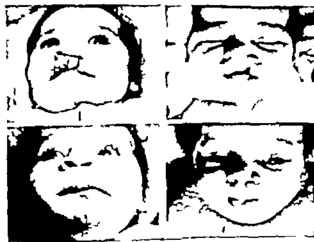


Fig. 126. Patient operated 24 hours after birth following the same method.



Fig. 127 Patient operated late following the method described

folgt ist teilen wir den zur Auskleidung bestimmten überschüssigen Hautlappen in zwei Teile. Indem wir eine Rückwärts-Abwärtsdrehung des auskleidenden Lappens ausführen fügen und nähen wir ihn an der unbekleideten seitlichen Nasenlücke an, wodurch jedes mögliche Zurückgleiten verhindert wird.

Deformidad Nasal y Fisura Labial Simple. Lorenzo Mir y Mir.

(1) El desplazamiento posterior de la base del ala y la (2) la deformidad (angulación) de la porción media del borde del ala. Son la expresión del proceso cicatricial y se presentan en los casos en que es necesario cortar verticalmente (debridamiento) el forro lateral de la nariz enfrente del cornete inferior con ello pemanece una superficie cruenta de base inferior que estando constituída por tejidos blandos que no ofrecen resistencia cicatriza principalmente por contracción.

Utilizamos la técnica de Blair Brown con un escalpelo puntiagudo cortamos de manera de obtener un exceso de mucosa cuando se hace la movilización amplia de los tejidos y el debridamiento de la mucosa lateral de la nariz Cortamos en dos el colgajo cutáneo efectuando una rotación hacia atrás y arriba del cogajo mucoso el cual suturamos a la brecha nasal con lo cual se previene el desplazamiento hacia atrás.



Fig 128 Case where operation took place still later following the same method.

Nasal Tip Deformities Associated with Hare Lip. JOHN POTTER, F R C S E, *"York House," 198, Bishopton Road, Stockton-on Tees, England*

The nasal tip being the centre of the face, defects here are glaring, and even small unilateral defects are conspicuous due to the proximity of the normal side

I propose to discuss the late nasal tip deformities associated with unilateral and bilateral hare lips which have been repaired The defects have great importance from both cosmetic and functional aspects

The defect is primarily in the alar cartilage or cartilages, frequently referred to as the lower lateral cartilages The alar cartilages form the anatomical framework of the nasal tip and the covering skin is draped over these, the contour depends upon the shape of these cartilages The distorted cartilage projects abnormally into the nasal lumen and causes interference with the inspiratory air currents

In the unilateral case, the medial crus of the alar cartilage is shorter than its fellow, the lateral crus therefore forms a lower flatter arch than the normal side It is frequently distorted into the lumen of the nose, the outer surface instead of lying immediately beneath the skin is rotated inwards into the nasal cavity, it there forms a ridge, covered by nasal mucosa and cause varying degrees of obstruction

In the bilateral cases, the nasal tip is depressed with a short columella, which at times seems almost non-existent because the medial crura of the alar cartilages are extremely short The lateral crura both form flat arches, and project to varying degrees into the nasal lumen frequently causing complete nasal obstruction The typical deformity has a flattened tip with a short columella and broad flat nostrils, and a porcine appearance The technique of operative repair has been described in detail (Plastic & Reconstructive Surgery, May 1954), and the diagrams are reproduced here (Figs 129 and 130), "Open" reduction of the alar cartilages

The functional effects, as stated above, are varying degrees of nasal obstruction, the displaced alar cartilage causes an interference with the normal inspiratory air currents Extensive work on problems of nasal obstruction has been done by Dr A W Proetz (St Louis) Because

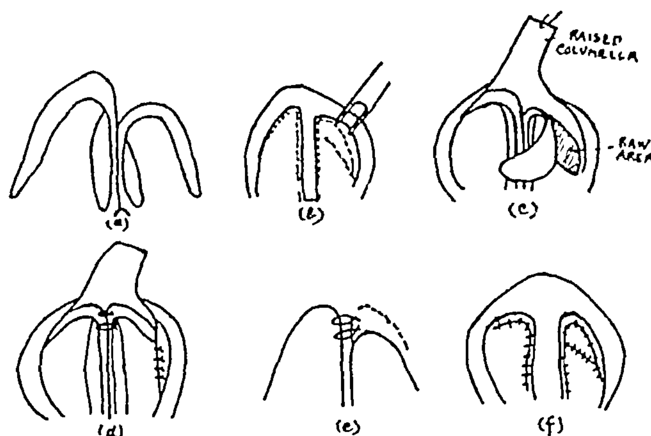


FIG 129 Diagrams showing method of repair in unilateral flattened nasal tip
- a Showing the abnormal alar cartilage balance responsible for unilateral flat nostril
- b Incisions
- c Abnormal alar cartilage freed and delivered
- d Cartilages sutured to give balanced height
- e Dotted line shows new position of alar cartilage after operation
- f Columella and cartilages sutured into position

the air passages are distorted, deposits occur in the nasal mucosa beyond the obstruction, during inspiration, there is no deposit proximal This causes a local drying, the cilia are lost, infection follows and this tends to be chronic with discharge and frequent acute exacerbations When the obstruction is removed the epithelium returns to normal

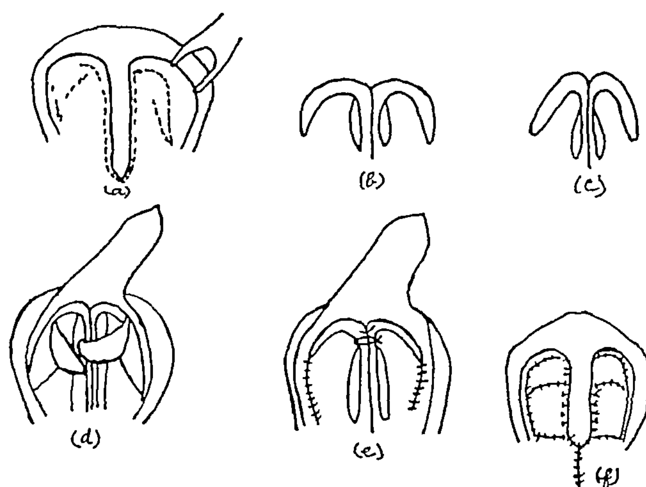


FIG 130 Diagrams showing method of repair in bilateral flattened nasal tip
- a Incisions
- b Flattened alar cartilages
- c Proposed new position of alar cartilages
- d Alar cartilages being mobilized
- e New height of medial crura
- f Closure of incisions



FIG. 131 Case 1 Unilateral flattened nasal tip *a, b c* Before operation, show marked deformity with kink, flattening and eversion of alar rim The alar cartilage can be seen in its abnormal position projecting into the lumen of the nose *d, e f* After operation shows correction. A small wedge of skin was excised to adjust alar rim

I have noted the frequent history in these cases, of chronic nasal obstruction with discharge which clears up following the operation. The patients frequently do not complain of an obstruction since they have had it from child hood, but after operation state they are now able to breathe freely and the discharge has disappeared.

REFERENCES

1 Potter J Plastic and Reconstruction Surgery Vol 13 p 358 1954
2 Proetz A. W Journal of Laryngology and Otology Vol. 67 p 1 1953

Déformations du Bout du Nez Concomitantes avec un Bec de Lievre. JOHN POTTER

Les déformations du bout du nez coïncident avec des becs de lièvre précédemment réparés peuvant être unilatéral es ou bilatérales. Les malformations sont très importantes tant du point de vue esthétique que fonctionnelle.

La déformation est due à la position anormale du ou des cartilages à l air Ils sont anormalement tournés en bas et en dedans vers l orifice nasal et on peut voir se projeter dans la lumière nasale entraînant un certain degré d obstruction

Du point de vue esthétique dans les cas à déformation unilatérale le côté anormal est plus bas, plus aplati que le côté normal tandis que dans les cas bilatéraux le bout du nez est aplati avec narines larges et columelle court.

Le retentissement fonctionnel consiste en une obstruction nasale de degré divers. Les cartilages déplacés gênent le flux d air inspiratoire normal et a pour conséquence un dessèchement de la muqueuse nasale avec infection et écoulement surajoutés. Description de l opération en détail (Potter Plastic and Reconstructive Surgery mai 1954)

FIG 132 Case 2 Bilateral flattened nasal tip *a b c d* Before operation, showing the gross flat tip and short columella *e f g h* After operation An Abbé flap has also been inserted into the lip The scars are to be adjusted later A nasal reduction has been performed and alae also adjusted

Nasenspitzendeformitaten bei Lippenspalten. JOHN POTTER

Nasenspitzendeformitaten vergesellschaftet mit voroperierten Hasenscharten konnen einseitig oder doppelseitig sein Die Defekte haben grosse Bedeutung vom Gesichtspunkt der Kosmetik und der Funktion

Die Deformitat beruht auf einer abnormen Stellung des Flugelknorpels oder der Flugelknorpel Diese sind abnorm nach unten und medialwarts zum Nasengang hinein gedreht, und man kann sie in den Nasengang hinein ragen sehen, wo sie einen gewissen Grad von Undurchlassigkeit verursachen

Die kosmetischen Defekte In einseitigen Fallen ist die abnorme Seite niedriger und flacher als die normale, wahrend in doppelseitigen Fallen die Spitze abgeflacht ist mit breiten Nasenlochern und einem kurzen hautigen Septum

Die Wirkung auf die Funktion besteht in verschiedenen Graden nasaler Undurchlassigkeit Die verlagerten Knorpel beeintrachtigen den normalen inspiratorischen Luftstrom und bewirken Austrocknung der Nasenschleimhaut mit nachfolgenden Infektionen und Nasensekretion Die Operation wird im einzelnen beschrieben (Potter Plastische Wiederherstellungschirurgie, Mai 54)

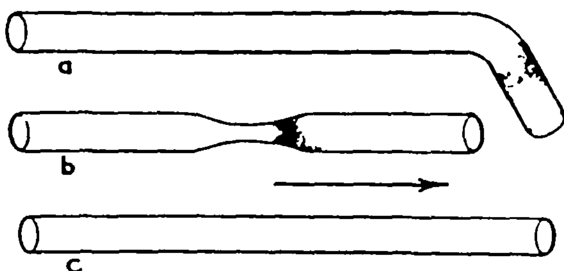


FIG 133 From Dr Proetz's paper
Particles, air-borne in streams passing through tubes, are deposited
a) distal to bend,
b) distal to constriction,
In a straight tube of even calibre
c) deposit is negligible

Deformidades de la Punta Nasal Asociadas con Fisura Labial. JOHN POTTER

Deformidades de la punta nasal asociadas a secuelas quirúrgicas de labio leporino pueden ser unilaterales o bilaterales Estos defectos son importantes desde el punto de vista estético y funcional

La deformidad es debida a la posición anormal de los cartílagos alares, los cuales se encuentran hacía abajo y adentro en el conducto aéreo nasal, pudiendo verse en el lúmen vestibular causando obstrucción

Desde el punto de vista estético en el defecto unilateral el lado anormal se encuentra descendido y plano, mientras que en los casos bilaterales la

punta está aplanada con amplios orificios y subtabique corto

Los efectos funcionales consisten en grados variables de obstrucción nasal por interferencia cartilaginosa en el momento de la inspiración resequedad de la mucosa nasal infección y secreción

La operación se describe en detalle

Correction of Nose Deformities During the First Operation of Unilateral Harelips. RICHARD TRAUNER, M D, *Professor, Schillerstrasse 30, Graz, Austria*

In only a very small number of cases of harelip is the shape of the nose quite normal Even in such cases where only the lower part of the lip is split, the nostril will often be broad and flattened lying more horizontally as compared with the other side (Figs 141 and 142) The lateral end of the wing of the nose stands to a certain degree more lateral and backwards the medial end reaching slightly downwards. In such cases the bone under the lip is also frequently split and even in the upper part of the lip the muscle and subcutaneous tissues are thinner than normal although the skin of the lip and the nasal mucous membrane may not be split This deformity of the nose becomes worse in a complete unilateral cleft, where the wing of the nose is more or less completely flattened (Fig 143) its lateral end standing lateral backwards and also lower while its medial end with the alar cartilage reaches lower and is somewhat descending from the tip of the nose. The nasal mucosa is cleft.

The causes of such nose deformities are the following The lateral end of the wing is connected by means of rather dense subcutaneous tissues to the alveolar processus laterally of the cleft this bone being usually in a more backward position than in normal cases. Consequently the lateral nasal mucosa is shortened in its anterior posterior extent drawing the centre part of the wing the lateral crus of the alar cartilage backwards, owing to this cartilage being firmly attached to the mucosa, whereas more and looser subcutaneous tissues are to be found between the latter and the skin. Medially the lower end of the medial crus is attached to the mucosa too and is drawn slightly downwards The inner side of the columella in its turn is somewhat shortened on this side of the cleft

Furthermore, in a complete cleft not only the mucosa but also the skin of the lip are abnormally united on both sides of the cleft and in the same deformed way the nasal mucosa is connected with the oral mucosa of the palate and the vestibulum oris. The skin of the vestibulum nasi inside the nose itself is also fixed to the nasal mucosa in an abnormal position.

Owing to this deformity both the wing of the nose and the alar cartilage have lost their normal curvature. The angle between the medial and lateral crus of the cartilage at the tip of the nose less accentuated and separated from the cartilage of the other side. If the cartilage remains for some time in such a deformed position it will have a tendency even if freed by means of an operation to reassume the same position as before on account of its elasticity If this operation is performed at an early stage the cartilage may be brought into its normal position. Thus we should try even during the first operation to do the best we can in this direction without disturbing the further growth of the nose In the course of the operation it is however more difficult to obtain a wellshaped nose than a nice lip

The author holds the view that a Hagedorn operation in its new modification by Le Mesurier really represents the best method of obtaining a wellshaped lip But since Le Mesurier does not touch in his papers the question concerning the shape of the nostril the author considers it an important point to combine Le Mesurier's method with another operative method for the purpose of achieving a comparatively wellshaped nose in the primary operation of harelip.

The great advantage of the Le Mesurier operation does not lie so much in the fact of lengthening but in its broadening the lip It may sometimes even lengthen it too much For making the lip sufficiently broad it is essential that the lateral flap be made as long as possible

The operation for repair of an incomplete harelip with a deformity of the nose is somewhat different from that in a case of complete unilateral cleft in principle it is however the same. In a case of an incomplete harelip Le Mesurier places his typical cut medially suturing the lateral flap to the midline. The skin on both sides of the cleft he then removes

up to a point in the centre of the entrance to the nose (Fig 134, a, b, c)

These skin flaps may, however, be very well used otherwise and I do not remove them (Fig 135) The first incision in the author's method passes vertically from the upper end of the entrance of the nose A second cut runs from point B′ to a point below the lateral end of the wing of the nose These two incisions encircle a flap with its base pointing upwards A third cut on the medial side runs horizontally from the upper end of the first incision to the base of the columella thus forming a second flap (Fig 135, left and center) Transposing two flaps the lateral one will be situated horizontally at the entrance of the nose, in this way bridging the line of the cleft at the upper border of the lip and forming the entrance of the nose symmetrically with the other side (Fig 135, right) The medial flap is then sutured with its tip to a point below the wing of the nose By means of this so-called Z-Plastic of interchanging the flaps at the entrance of the nose we are able to achieve the following results (Fig 136)

By this operative method we are able to draw the lateral end of the wing upwards if it lies too far downwards, we may also lengthen the lip at the line of the cleft on its upper border, lengthening at the same time the columella on the side of the cleft and narrowing the entrance of the nostril Thus the nostril will assume a more upright position symmetrical with the other side The more we wish to narrow the nostril—that is to shift the lateral end of the wing medially—the higher up we have to enter the nose with the tip of flap B It is essential to ascertain exactly the lines of the incision in each case individually If we wish to lengthen the cleft side of the columella we have to circumcise it in the midline and at its lower end



Fig 135 Operation on a harelip with deformity of the nose after Le Mesurier and Z-Plastic at the entrance of the nose (Left) Medially the usual oblique incision (DB) is made, laterally the flap D′B′C′ is circumcised The borderlines of the cleft are freshened up to the entrance of the nose In the upper part of the lip two small flaps are circumcised the lateral one by a cut from point B′ (or C′) upwards to the wing of the nose, the medial one by a horizontal cut from the upper end of the cleft line to the base of the columella (Center) Laterally the Le Mesurier flap is mobilized to be sutured to the midline Above it the small flap is pedicled at the ala of the nose and will be rotated upwards to form the lower border of the nostril Medially the two incisions are carried through all layers (Right) First the lower part of the lip is sutured according to Le Mesurier A few deep sutures keep the flaps in the desired position At y y′ I place a strong muscle suture similar to that of Veau Then above the two flaps of the Z-Plastic are exchanged and sutured in position according to the degree of the nose deformity Point A is sutured to A′ at the base of the columella, point E to E′ below the wing of the nose The lateral flap crosses the cleft line at its upper end and forms the lower border of the nostril symmetrical to the other side It has to be sutured to the base of the columella and the front edge of the nasal floor



Fig 134 The Le Mesurier operation —After forming his flap CDE and his oblique incision HGF on the medial side Le Mesurier cuts away two broad strips of skin on both sides of the cleft from D to A and from F to B

pushing it with the medial crus of the alar cartilage upwards and towards the tip of the nose In the case of an incomplete cleft, however, any such alterations carried out to correct the position of the nostril will only be necessary to a lesser degree

This method was originally adopted by the author for reoperations on harelips only In many previously operated cases the shape of the nose had not been satisfactory Thus the lateral end of the wing usually has to be drawn upwards and to some extent medially (Fig 144) If we want to shift this also forward the lip will have to be separated and a complete reoperation carried out The frontal part of the wing with its medial crus of the alar cartilage is found to be located somewhat downwards from the tip of the nose and therefore it is mostly impossible in such old cases to bring it upwards into its

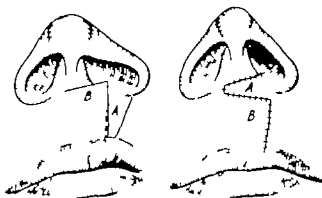


FIG. 136 Z-Plastic at the entrance of the nose *for reoperation of a unilateral harelip By exchang*ing the two flaps A and B the wing of the nose can be situated more medially and higher up and the lip may be heightened The lateral border line of flap B must be as much longer than the lateral borderline of flap A as the distance between the vermilion border and the wing of the nose should be lengthened the upper borderline of flap B must be as much shorter than the distance from the midline to the wing of the nose as the latter should be placed medially The cleft side of the columella can be lengthened by the broadness of flap A at its end If we have to shift it upwards to the tip of the nose with the medial crus of the alar cartilage we may circumcise it at first with two vertical cuts one in the midline the other on its inside At the same time we fix the cartilage in the tip of the nose with a few firm sutures to that of the other side in a symmetrical position.

proper position without suturing the cartilage to that of the other side at the tip of the nose In these cases the author proposes to circumcise half of the columella on the side of the cleft with a cut in the midline at its base and inside the nostril *After pushing it a few millimeters* towards the tip of the nose both cartilages are sutured together in their proper position Flap A of the Z-plastic which in such a case is extended as far as possible in the direction towards the vermilion border thus lengthens the lower end of the columella on the side of the cleft Sometimes I free the whole skin of the columella from the cartilages after an oblique incision at its base to lengthen it at the same time

Another method of reshaping a horizontal nostril and *bringing it into a vertical position* symmetrical with the other side may be carried out by turning its borders on the left clockwise while on the right side anti-clock wise The author had only poor results with this method in cases of reoperations on complete clefts The already once sutured part of the floor of the nose is rather difficult to free again and it shows a marked tendency to fall back into its old position

Moreover we will often have to carry out also other corrections to lip and nose in cases of old unilateral clefts but this would be beyond the scope of this short paper As to the nose we frequently implant a bit of ear cartilage into the tip of the nose on the cleft side, whereas sometimes we have to reduce the tip cartilage on the sound side It will also be necessary to correct any deviation of the septum or of the whole nose *while in some cases we have to re*duce its size in several directions. The conditions we find in cases of bilateral clefts are again different.

In the primary operation on a complete unilateral cleft however we have to consider other important points Victor Veau showed that we should suture the split nasal mucous membrane as well as the lip during the first operation. If this—although not visible—is left open there will always remain a fistula between the nose and the mouth in the region of the *vestibulum* oris and the alveolar process and it is difficult to retain the lateral end of the ala in its correct position also the nasal floor will not be closed and formed properly To achieve this we have to free the nasal mucosa on the lateral side and the mucosa of the Vomer medially from their abnormal adhesions and suture them together in the midline of the cleft (Figs. 137 and 138) To bring the lateral end of the wing of the nose which is fixed at its back to the bone of the *maxilla* into a sufficiently *forward position it is* essential to continue the cut between the nasal mucosa and the inner skin of the ala slightly forward and to free the lip and the nostril from the bone For the purpose of keeping the ala in its proper place it will have to be fixed with a deep stay suture Nevertheless in many of the cases operated by the original method of Veau we have experienced that the wing of the nose did not assume its normal curvature

As mentioned earlier the shortened nasal mucosa *pulls the wing of the nose backwards* and when we cut across it slightly in front of the forward end of the lower turbinate (point M in Fig 137) we are able to push the anterior part forward. In doing so the wing of the nose receives its normal curvature Blair and Brown have already made this vertical cut through the

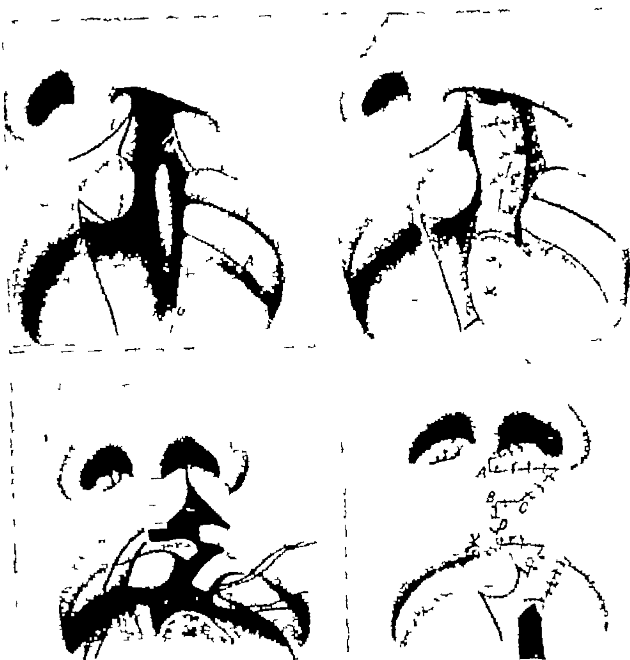


Fig 137 (top left) Unilateral complete cleft—Incision for the mobilization of the nasal mucosa (laterally) and the vomer flap—At M a vertical incision through the nasal mucosa anterior to the front end of the lower Turbinate is to be made It is often essential to move the wing of the nose forward and thus it may achieve its normal curvature

Fig 138 (top right) Suture of the nasal mucosa and the vomer flap for building up the nasal floor

Fig 139 (bottom left) A small flap from the lateral mucous membrane has been split off by a horizontal incision and rotated backwards to cover the raw under surface of the nasal mucosa to which it will be fixed by two sutures A second small flap from the medial side is sutured into the gap of the lateral incision

Fig 140 (bottom right) Suture lines at the end of an operation for a unilateral complete cleft The lip is operated after Le Mesurier's method plus Z-Plastic at the entrance of the nose The floor of the nose is sutured and then covered with a flap from the lateral oral mucosa

nasal mucosa, but without suturing the floor of the nose as advocated by Veau I carry out this incision although there may be a certain gap in the nasal mucosa after it The author therefore suggests that the vomer flap be made as long as possible for the purpose of filling the gap in the lateral mucosa caused by the above cut (Fig 137) In order to keep the lateral end of the wing of the nose in its proper position and to avoid its falling back to the upper jaw, I usually line it with a piece of subcutaneous tissue taken from the cheek or from the upper part of the lip and apply a deep stay suture which is fastened to the skin of the opposite nostril The sutured floor of the nose is then covered orally with a small flap of mucosa taken from the lateral side of the lip (Fig 139) Finally I suture the lip by the method described by Le Mesurier in addition to the Z-plastic at the entrance of the nose as outlined previously (Fig 140)

Figures 141 and 142 show two incomplete unilateral harelips with nose deformities before and after the operation of Le Mesurier plus a Z-plastic at the entrance of the nose according to the method shown in Fig 135

Figure 143 shows a complete unilateral cleft before and after closure following the method given in Figs 135, 137-140

Figure 144 again demonstrates a previously operated complete unilateral cleft prior to and after the operation on the lip as well as the reshaping of the floor of the nose together with corrections of the nose deformity according to the method shown in Fig 136



Fig 141 (top) Incomplete harelip but with deformity of the nose The nostril lies more horizontally than on the other side, its entrance is broadened, its height diminished The lateral end of the wing of the nose stands more laterally and lower (Bottom) After the Le Mesurier operation plus Z-Plastic at the entrance of the nose the wing of the nose stands on the same level as the wing of the other side Nostrils and lip marked are symmetrical

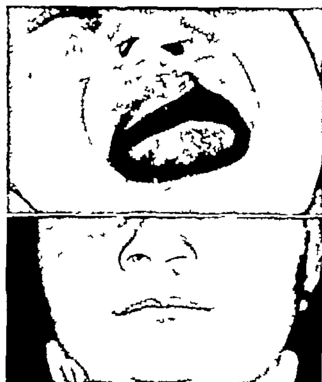


FIG. 142 (top) Cleft only in the lower part of the lip but with a marked deformity of the nose The nostril is broader the columella is deviated to the other side at its base The upper part of the lip above the cleft is less prominent, and contains less subcutaneous tissue (Bottom) After the Le Mesurier operation and exchange of two small flaps at the entrance of the nose the columella is now in the midline the cupid bow is strongly marked.

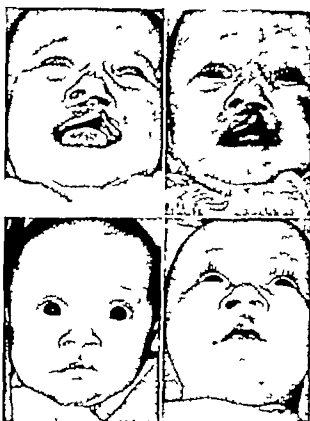


FIG 143 (top) Complete unilateral cleft with a small bridge of skin in the upper part of the lip The wing of the nose is horizontally extended, its lateral end is dislocated laterally and backwards. (Bottom) After the Le Mesurier operation plus Z-Plastic at the entrance of the nose the wing has achieved its normal curvature The lower border of the nostril is shaped symmetrically to the other side Slightly marked cupid's bow

SUMMARY

In all cases of complete unilateral cleft and in most cases of unilateral harelip the shape of the nose is found to be more or less deformed We should correct this deformity as far as possible during the first operation. For this purpose a method has been developed in which we transpose at the entrance of the nose small flaps of skin obtained from the upper part of the lip (Z-Plastic) in combination with the operation by Le Mesurier

The most important point in this operation is to suture the lip after transposing two flaps at its upper and lower borders in order to bridge the line of the cleft and to shape the border symmetrically with the other side, forming a cupid s bow below and a vertical nostril with a curved ala and well shaped entrance above.

This so called Z-Plastic is often used for re operations on previously operated cases together with a resuturing of the lip and a union of both alar cartilages at the tip of the nose while in cases of complete clefts it is combined with suture of the nasal floor Some details for mobilizing suturing and covering the nasal mucous membrance orally were described in this paper In operated cases a complete closure of the cleft between nose and mouth can be effected in this way and our endeavor is to achieve a symmetrical appearance of lip and nose as far as possible.

Correction des Déformations Nasales au Cours de la Première Opération pour Becs de Lièvre Unilateraux. RICHARD TRAUNER.

Le profil du nez est plus ou moins deformé dans tous les cas de division unilatérale complète et dans la plupart des cas de becs de lièvre unilatér aux. Cette déformation devrait être corrigée dans la mesure du possible au cours de la première intervention. Dans ce but l'auteur a mis au point une méthode dans laquelle il insère à l entrée du

nez de petits lambeaux de peau provenant de la partie supérieure de la lèvre (plastie en Z), cette insertion étant combinée avec l'opération de Le Mesurier

Cette plastie en Z est également utilisée fréquemment quand on reintervient chez des sujets précédemment opérés alors que dans des cas de division complète on la combine avec la suture du plancher nasal Description également dans cet article de quelques détails relatifs à la mobilisation, à la suture et au recouvrement de la muqueuse nasale

Korrekturoperationen der Nase wahrend der ersten Operation von einseitigen Lippenspalten. RICHARD TRAUMER

In allen Fallen von kompletten einseitigen Lippen-Kiefer-Gaumenspalten und in den meisten Fallen von einseitigen Lippenspalten findet man die Form der Nase mehr oder minder deformiert Wir sollten diese Deformitaten so weit als moglich wahrend der ersten Operation korrigieren Zu diesem Zwecke wurde eine Methode entwickelt, bei der wir am Eingang der Nase 2 schmale Lappchen, die aus dem oberen Teil der Lippe gewonnen werden (Z-Plastik) auswechweln und diese mit der Operation nach Le Mesurier kombinieren Diese Z-Plastik wird auch oft bei Reoperationen von vorher operierten Fallen zugleich mit einer neuerlichen Naht der Lippe und einer Vereinigung der beiden Flugknorpel in der Spitze der Nase verwendet In Fallen von kompletten Spalten wird sie mit der Naht des Nasenbodens kombiniert Es werden noch einige Details zur Mobilisation und Naht und oralen Deckung der Nasenschleimhaut in dieser Arbeit beschrieben



FIG 144 (left) Unilateral cleft before reoperation—The floor of the nose has not been sutured and is open to the mouth The lower border of the nostril is drawn into the line of the cleft Typical deformity of the wing of the nose, its lateral end stands too far laterally and backwards, its front end with the alar cartilage is too low The lip on the cleft side is shorter than the other one

Right After the complete reoperation and dissection of the lip in the suture line The floor of the nose has been rebuilt and sutured The lateral end of the nasal wing is brought forward by being mobilised from the upper jaw and it is underlined with subcutaneous tissue and kept in position by a deep stay suture, which is knotted in the nostril of the other side The lip has been resutured and the nose deformity corrected by a Z-Plastic at the entrance of the nose as shown in fig 136 The flap is sutured to the base of the columella and to the front edge of the sutured floor of the mouth Half of the columella on the side of the cleft has been circumcised and moved upwards to the tip of the nose, where both alar cartilages are sutured together into a symmetrical position

Correccion de Deformidades Nasales Durante la Primera Operacion de Fisuras Labiales Unilaterales. RICHARD TRAUNER

En todos los casos de fisura labial unilateral la forma nasal se encuentra deformada Esto debe corregirse durante la primera operación Para ello, los autores han desarrollado un método en el cual entrelazan en la entrada de la naríz pequeños colgajos de piel obtenidos de la parte superior del labio (zetaplastía), en combinación con la operación de Le Mesurier

Esto llamado zetaplastía se utiliza para la reoperación de casos operados previamente y en casos de fisuras complejas se combina con la sutura del piso nasal

Se dan detalles para movilizar, suturar y cubrir la membrana mucosa nasal

---

Results and Technique on 3000 Cleft Palate Cases.

JACQUES RÉCAMIER, M D, *1 rue du Régard, Paris VIe, France*

Three thousand cleft palates now have been operated upon according to Veau's technique, by three surgeons Dr Veau himself, my assistant Michel Florentin, and myself

A brief account of our results, past and present, and the rules imposed by experience which guide our conduct in the treatment of cleft palate seem indicated at this time

Veau first conceived his technique in 1921, and four years were required to perfect it The wire muscular suture of the velum was first tried in 1922 on his 82nd cleft palate Not until the 132nd case dared he try the two posterior pedicled palatine flaps

In 1925 Veau perfected the freeing and suture of the nasal mucosa in all cases Following this, in about 200 cases he used the same technique for all cleft palates, except for a few minor details—as follows

Wire muscle suture of the velum, complete nasal mucosa suture, two posterior pedicled palatine flaps, preserving the posterior palatine

artery As often as possible, operation was performed between 12 and 18 months of age

What have been the anatomic results? We only regard as a successful anatomic result the complete closure of the cleft, velum and palate, in one sitting (with the exception of small defects behind the teeth associated with the lip operation and which have little effect on phonation) In his book (1931) Veau claimed 82 per cent anatomical successes from this one-stage procedure At present in our last 500 with the help of antibiotics we can claim 90 per cent successes and 92 per cent for the last 100 cases

Ninety two per cent anatomic success for the one-stage operation seems a good average but most surgeons have equally good results (Battle writes in the British Journal of Plastic Surgery Closure of the cleft palate is no longer a problem)

But what is the meaning of 92 per cent anatomic successes in relation to speech results? There are certainly not 92 per cent good speech results

A good phonetic result means absolutely normal speech, without the slightest nasal tone.

Experience has shown that if all cleft palate cases were closed at 12 months in one sitting some velums would still be too short to occlude the pharynx. The number of these is hard to determine. All of our cleft palate patients are summoned when 6 or 8 years of age and Madame Borel makes phonetic and radiographic records of each case. Most of the children return but a few do not reply so our statistics are not absolute.

In 1933 Veau reported 75 per cent perfect phonetic successes in children operated on before 18 months (I believe we have a little higher percentage now) Although knowledge about our program is widespread, many children, especially with single cleft palates come late to the surgeon (In our last 100 82 were less than 18 months old, 9 less than 4 years, 8 between 4 and 5 years, one 10 years old.) In these circumstances it is reasonable to expect 20 per cent more or less poor speech.

What should be done about the 20 per cent? The easy way (I would like to say the lazy way) is to get rid of them by saying "I have done my best now go to the prosthetist." I have great respect for the prosthetist! We only send him the bad cases—he never complains. The worse the case the better he likes it i.e. large defects from surgical failure rather than those with a short velum, apparently normal. The prosthetist is our last hope after disaster and often with great skill from a surgical failure he obtains a good speech success. It is splendid and I can't say how thankful I am for his help! But for a surgeon real success must be a perfect phonetic result, after operation!

So what about those 20 per cent? Half of them have minor phonetic defects are happy with a slight nasality and wont hear of another operation

For the rest with major speech defects for the past two years I have performed secondarily the Rosenthal pharyngeal flap operation, flap based downward, sutured to the buccal side of the velum When necessary in isolated cleft palate I combine this with the Dorrance push-back.

Forty two older children or adults have been operated on at St. Michael s Hospital since 1952, Madame Borel keeping phonetic records before and after operation. At the same time my friend Dr Petit at St. Vincent s Hospital has done 28 pharyngeal flap operations, but the flap is based upward, like Sanvenero Rosselli.

Cases are too different and too recent to give an exact report but in some the phonetic results were so spectacular that we expect many to have an absolutely normal phonation (with, or without speech therapy)

About 1930 Veau had friendly discussions with Professor Rosenthal about the pharyngeal flap He tried the technique without success, for he asked too much of the flap as he tried to close a defect in the hard palate with it Since then Veau never used the pharyngeal flap But everyone will remember how objective and fair minded he was honestly admitting he was wrong after experience Seeing our actual results if he were still alive Veau would be here to apologize and tell you that experience has changed his opinion on the Rosenthal operation since he wrote his book! I have come to do it for him and that is the main reason for my asking to speak at this Congress After further experience I am quite sure the pharyngeal flap will help us to advance our phonetically perfect results from 80 to 85 or 90 per cent

In conclusion, our present procedure is Oper

ation at 12 to 14 months, strictly the Veau operation, which I still believe causes minimal injury to the velum

Secondarily, if incomplete speech result, Rosenthal's pharyngeal flap operation, after 13 years of age

Après 3.000 Operations de Division Palatine
JACQUES RÉCAMIER

On a à ce jour opéré 3 000 divisions palatines selon la technique de Veau à l'Hôpital Saint-Michel de Paris

Résultats anatomiques fermétur complète du voile et du palais dans 92% des cas et en une séance pour les 100 derniers cas

Résultats phonétiques que signifient 92% de succès anatomiques en ce qui concerne les résultats phonétiques?

Avec la technique de Veau qui ne blesse pas le voile du palais on a obtenu chez les sujets opérés avant le 18e mois 80% de résultats phonétiques parraits avec ou sans l'aide de la rééducation Les 20% restants présentent des troubles phonétiques plus ou moins importants (voile du palais court, opération en deux temps, intervention tardive)

L'auteur soumet ses malades actuellement et de façon secondaire à l'opération de Rosenthal (lambeau pharyngé à base inférieure) qu'il effectue après l'âge de 13 ans, ce qui dans un grand nombre de cas a donné de bons résultats Cela fait que les résultats terminaux sont bons du point de vue phonétique dans 90% des cas Il n'a jamais semblé utile d'utiliser un lambeau tubulé pour la fermeture d'une perte de substance palatine, à moins de frais les prothèses donnent de meilleurs résultats (2 à 3% des cas)

Ruckblick auf 3000 Gaumenspaltenoperationen.
JACQUES RECAMIER

Bisher wurden 3000 Gaumenspalten nach der Methode von Veau im St Michael-Hospital in Paris operiert Anatomische Ergebnisse Bei den letzten 100 Fallen 92% vollkommener Verschluss des gespaltenen Velum und Gaumens in einer Sitzung

Phonetische Ergebnisse Was bedeuten 92% anatomische Erfolge in Bezug auf die phonetischen Ergebnisse?

Mit Veau's Methode, die das Gaumensegel nicht verletzt, etwa 80% vollkommene phonetische Ergebnisse mit oder ohne Spracherziehung-wenn die Operation vor dem 18 Monat stattfindet Zwanzig Prozent haben grossere phonetische Mangel (kurzes Velum, 2-zeitige Operation, Spat-operation)

Fur diese Patienten (13 Jahre und alter) fuhren wir nun in vielen Fallen die Sekundar-Operation nach Rosenthal (Pharynxlappen mit Basis nach unten) mit guten Erfolg durch So sind schlieszlich die sehr guten phonetischen Ergebnisse etwa 90% Es erschien niemals zweckmassig, einen Rundstiellappen zu gebrauchen, um einen Defekt im Gaumen zu schliessen Mit weniger Schwierigkeiten (2 oder 3%) erfullt eine Prothese den Zweck besser

Resultado de Tres Mil Operaciones por Fisura Palatina. JACQUES RECAMIER

Tres mil fisuras palatinas han sido operadas con la técnica de VEAU en el Hospital San Michel de Paris

Resultados anatómicos 92% de oclusión completa en los paladares blando y duro en una sola sesión en el último centenar de pacientes operados

Resultados fonéticos Qué significan 92% de éxito anatómico en lo referente a la fonética? Con la técnica de VEAU que no mutila el velo, se obtienen 80% de resultados fonéticos perfectos, con o sin reeducación, si la operación se hace antes de los 18 meses 20% tienen defectos fonéticos

Para estos pacientes trabajamos ahora después de los 13 años de edad La operación de Rosenthal (Colgajo faríngeo con base inferior) en muchos casos ha dado buen resultado, de modo que al fin se obtienen buenos resultados fonéticos en 90% de los casos Nunca nos ha parecido necesario utilizar un colgajo cutáneo para cerrar el paladar defectuoso En estos casos nos parece mejor una prótesis

---

The Treatment of Hare Lips and Cleft Palates in Finland: The National Organization for Their Care.

ATSO I SOIVIO, M D, *Helsinki, Finland*

Cases of hare lips and cleft palates constitute an important field in surgery Even in a hospital of plastic surgery they constitute a considerable percentage of the material

Since 1936, the treatment of hare lips and cleft palates in Finland has become entrusted to one single care centre At present this centralization has been completed This measure of centralization to intensify the treatment of cases concerned has taken place on a voluntary basis An appeal was made to the physicians, above all, surgeons, to send all cases of hare lips and cleft palates known to them to the care centre, and in this way it became possible to collect the material The nurses and health nurses as well as midwives in the provinces have also rendered great help in this work Nowadays, precise information on all cases observed by them is sent without delay from all over Finland to the Finnish Red Cross Hospital of Plastic Surgery in Helsinki, which acts as this care

artery As often as possible operation was performed between 12 and 18 months of age

What have been the anatomic results? We only regard as a successful anatomic result the complete closure of the cleft velum and palate in one sitting (with the exception of small defects behind the teeth associated with the lip operation and which have little effect on phonation) In his book (1931) Veau claimed 82 per cent anatomical successes from this one-stage procedure At present in our last 500 with the help of antibiotics we can claim 90 per cent successes and 92 per cent for the last 100 cases

Ninety two per cent anatomic success for the one-stage operation seems a good average but most surgeons have equally good results (Battle writes in the British Journal of Plastic Surgery Closure of the cleft palate is no longer a problem)

But what is the meaning of 92 per cent anatomic successes in relation to speech results? There are certainly not 92 per cent good speech results

A good phonetic result means absolutely normal speech without the slightest nasal tone.

Experience has shown that if all cleft palate cases were closed at 12 months in one sitting some velums would still be too short to occlude the pharynx. The number of these is hard to determine All of our cleft palate patients are summoned when 6 or 8 years of age and Madame Borel makes phonetic and radiographic records of each case Most of the children return but a few do not reply so our statistics are not absolute.

In 1933 Veau reported 75 per cent perfect phonetic successes in children operated on before 18 months (I believe we have a little higher percentage now) Although knowledge about our program is widespread, many children especially with single cleft palates come late to the surgeon (In our last 100 82 were less than 18 months old, 9 less than 4 years 8 between 4 and 5 years one 10 years old.) In these circumstances it is reasonable to expect 20 per cent more or less poor speech.

What should be done about the 20 per cent? The easy way (I would like to say the lazy way) is to get rid of them by saying 'I have done my best now go to the prosthetist I have great respect for the prosthetist! We only send him the bad cases—he never complains The worse the case the better he likes it, i.e. large defects from surgical failure rather than those with a short velum apparently normal. The prosthetist is our last hope after disaster and often with great skill from a surgical failure he obtains a good speech success It is splendid and I can t say how thankful I am for his help! But for a surgeon, real success must be a perfect phonetic result after operation!

So what about those 20 per cent? Half of them have minor phonetic defects are happy with a slight nasality and wont hear of another operation

For the rest with major speech defects for the past two years I have performed secondarily the Rosenthal pharyngeal flap operation, flap based downward sutured to the buccal side of the velum. When necessary in isolated cleft palate I combine this with the Dorrance push-back.

Forty two older children or adults have been operated on at St Michael s Hospital since 1952, Madame Borel keeping phonetic records before and after operation At the same time my friend Dr Petit at St Vincent s Hospital has done 28 pharyngeal flap operations but the flap is based upward like Sanvenero Rosselli.

Cases are too different and too recent to give an exact report but in some the phonetic results were so spectacular that we expect many to have an absolutely normal phonation (with, or without speech therapy)

About 1930 Veau had friendly discussions with Professor Rosenthal about the pharyngeal flap He tried the technique without success for he asked too much of the flap as he tried to close a defect in the hard palate with it. Since then Veau never used the pharyngeal flap But everyone will remember how objective and fair minded he was honestly admitting he was wrong after experience Seeing our actual results if he were still alive Veau would be here to apologize and tell you that experience has changed his opinion on the Rosenthal operation since he wrote his book! I have come to do it for him and that is the main reason for my asking to speak at this Congress. After further experience I am quite sure the pharyngeal flap will help us to advance our phonetically perfect results from 80 to 85 or 90 per cent

In conclusion our present procedure is Oper

cations for good functional result consequently existed

10 Although the results as yet are good, there are still difficult problems to be solved in order to reach the hundred-per cent success which must be the ultimate goal of the treatment

Le Traitement du Bec de Lièvre et de la Division Palatine en Finlande. Organisation Nationale pour leur Traitement. ATSO SOIVIO

Depuis 1936 la chirurgie du bec de lièvre et de la division palatine ont été pour la Finlande centralisées à l'Hôpital de Chirurgie plastique de la Croix-Rouge à Helsinski Agissant à titre volontaire des médecins, des sage-femmes et des infirmières collaborent en adressant des rapports et des malades au centre en question Le nombre de cas traités est d'environ 200 par an 48% consistent en division palatine simple et 52% en bec de lièvre ou malformation double Depuis 1936 on y a traité plus de 3000 cas

Les indications de ce Centre sont les suivantes (1) Tenue de fichiers (2) Convocation des cas au moment optimum division palatine à l'age d'un an et demi à 2 ans, bec de lièvre à l'âge d'un mois et demi à 2 mois (3) Examen suivi des malades par un phoniatre, un dentiste et un chirurgien à la période préscolaire avec traitement approprié dans le cas d'amélioration nécessaire (4) Nécessité de se tenir au courant des progrès et des méthodes décrites ailleurs (5) Formation de personnel y compris de nouveaux chirurgiens

Les impressions personnelles de l'auteur sont les suivantes (1) meilleure centralisation (2) Absence de dogmatisme dans les techniques (3) La plastie en lambeau est meilleure que le bridge (4) La pharyngo-staphyloplastie secondaire si nécessaire (5) Nécessité pour les chirurgiens de travailler en collaboration avec les pédiatres, phoniatres et orthodontistes (6) Pas d'acte chirurgical pour les sujets malades ou déficients mentaux (7) Excellente protection assurée par l'anesthésie moderne et les antibiotiques (8) Bons résultats chirurgicaux Les 500 derniers cas de division palatine de l'auteur ont donné 95% de bons résultats anatomiques Le but à atteindre est de 100%

Die Behandlung von Hasenscharten und Gaumenspalten in Finland. Die Nationale Organisation fur ihre Behandlung. ATSO SOIVIO

Seit 1936 ist die chirurgische Behandlung von Lippen-Gaumenspalten in Finnland in dem Roten-Kreuz-Hospital fur plastische Chirurgie in Helsinki zentralisiert worden Auf einer freiwilligen Basis arbeiten Arzte, Hebammen und Schwestern zusammen an der Überweisung von Fallen und Informationen an diese Zentrale Es gibt etwa 200 Falle pro Jahr, etwa 48% sind einfache Gaumenspalten und 52% Lippenspalten oder beides. Seit 1936 wurden 3000 Falle behandelt

Die Aufgaben sind folgende (1) Krankengeschichten zu fuhren (2) Die Falle zu einer Optimalzeit einzuberufen, Gaumenspalten mit etwa 1,5 bis 2 Jahren, Lippenspalten oder beides mit 1,5 bis 2 Monaten (3) Nachuntersuchung der Vorschulkinder durch Sprachlehrer, Zahnarzte und Chirurgen mit entsprechenden Eingriffen, wenn Verbesserungen notwendig sind (4) Auf dem Laufenden bleiben mit neuen Entwicklungen und anderweitigen Methoden (5) Personal einschliesslich neuer Chirurgen ausbilden

Personliche Eindrucke sind (1) Zentralisation ist besser (2) Dogmatismus der Methoden sollte vermieden werden (3) Lappenplastik ist besser als Bruckenplastik (4) Sekundare Pharyngo-Staphylplastiken, wenn notwendig (5) Chirurgen mussen mit Sprachlehrern und Orthodonten zusammenarbeiten (6) Keine Chirurgie fur Kranke oder geistig Behinderte (7) Moderne Anaesthesie und Antibiotica bieten uns einen guten Schutz (8) Chirurgische Ergebnisse sind gut, meine letzten 500 Gaumenspalten sind 95% anatomisch gut Das Ziel muss sein 100%

El Tratamiento de la Fisura Labio Palatina en Finlandia. La Organizacion Nacional para su Cuidado. ATSO SOIVIO

Desde 1936 en Finlandia se ha centralizado el tratamiento de la fisura labio-palatina en el Hospital de la Cruz Roja dedicado a Cirugía Plástica en Helsinki

Voluntariamente médicos, parteras y enfermeras, operan enviando información y casos al Centro Hay doscientos casos por año 48 % simples y 52% complicados Desde 1936 se han tratado 3,000 casos

Los deberes son (1o) Conservación de records (2o) Llamado de casos en período óptimo paladar entre 1½ y dos años y labio entre 1½ y dos meses (3o) Registro periódico del foniartra, dentista y cirujano con el tratamiento adecuado (4o) Conservarse informado del desarrollo de éste tipo de cirugía en diversos países (5o) Entrenamiento del personal, incluyendo nuevos cirujanos

Las impresiones personales son (1o) La centralización es mejor (2o) Evítase el dogma en la técnica (3o) Plastía por colgajos es mejor que por deslizamiento (4o) Faringoestafiloplastía cuando necesaria (5o) Trabajo en grupo del cirujano, pediatra, foniartra y ortodoncista (6o) Evitar cirugía en los engermos mentales o en los inválidos (7o) Anestesia moderna y antibióticos (8o) Los resultados quirúrgicos son buenos En sus ultimos 500 casos el autor dice obtener 95% de buenos resultados anatómicos Su meta es 100%

centre. At this hospital records based on the above information are kept of all cases so they will be called at the right and optimal time for surgical treatment. The Finnish population today is 4.5 millions, and its birth rate is about 100,000 a year The figure of frequency of the deformities concerned is generally given as 1 per mille in the literature and the highest figure I have seen is 1.5 per mille which figure has been presented by Fogh-Andersen in Denmark. In Finland, the figure of frequency concerned is on the basis of my calculations, 1.8-2.0 per mille This figure is based on my study of the material found in the 20 year records at a well-known maternity hospital in Helsinki. This hospital receives mothers representing all social classes from all over Finland. All newborn infants are examined by the pediatrician of the maternity hospital with a special view to deformities so that my material should be very reliable. According to the above figures referring to the cases of deformities and birth rate, about 200 cases of hare lips and cleft palates are born in our country every year According to an investigation that I made in 1946 of 950 cases, the material was so divided that 48 per cent of the cases belong to simple cleft palates and the rest, 52 per cent, to the cases with either hare lip or hare lip with cleft palate. From 1936 up till now more than 3000 cleft cases have been treated in this care centre Unfortunately I cannot give the exact number since a part of the case reports was damaged in an air raid during the war

What are the duties of this kind of centre? As I already mentioned, one of its duties is keeping records of all cases of hare lips and cleft palates in Finland. Secondly the care centre calls different types of cases at a definite optimal time for surgical treatment. The cases of hare lip with cleft palates are called nowadays at the age of 1.5-2 months and cleft palates at the age of 1.5-2 years. The patients come for surgical treatment through the pediatric clinic where they have been examined and prepared for operation. Thirdly the patients are called for follow-up examination and for possible corrective and complemental operations once more to the centre before school age, i.e. before they are seven years old. On this occasion, also the speech therapist and the dentist working in cooperation with this centre examine the cases. The speech therapist is consulted as to possible complemental operations for the improvement of the faculty of speech in case the speech therapy alone would not bring in any results. The orthodontist examines and chooses the cases which later will need orthodontic care or possibly some other treatment belonging to the field of dentistry Furthermore, the duties of this kind of centre include keeping abreast with the development of hare lip-cleft palate surgery elsewhere in the world as well as the education and training of new cleft palate surgeons. This is a field in which the personal experience of the operator surely has a great significance in evaluating future results. For this reason, the operation material of the centre in question must be sufficiently large.

I would like to summarize my personal experience based on more than 3000 operated cases as follows

1 The centralization of harelips and cleft palates to care centres is surely advisable.

2 Excessive formality should be avoided as to the operative treatment of the cases.

3 Nowadays we have at our disposal several good methods of primary operation which, either as such or modified and combined with each other may bring in good results

4. It is my opinion, that the methods of the so-called flap plastic are better than those of bridge.

5 Secondary pharyngo-staphyloplastics are of great help in cases in which no satisfactory results have been achieved by means of primary operation.

6 The cooperation of the cleft palate surgeon with the pediatrician speech therapist and orthodontist is highly advisable, even imperative, in reaching final good results.

7 Children who are in poor general condition sick or mentally handicapped should not be operated upon.

8 The development of modern antibiotics and anesthesiology protects us from many dangers and complications.

9 Results achieved through surgical treatment must be considered good at present. In my material consisting of the latest 500 cleft palate cases, the primary anatomical surgical result was good in 95 per cent of the cases, i.e. the cleft closed, the palate of average length or longer the soft palate very mobile. The qualifi

physiological principles in order to have normal late development

There is no basis for supposing that in cases of unsuccessful cleft lip and cleft palate operations we may repeat them several times and achieve good results We must try to find the reasons for the failures and seek for more perfect technique based on surgical morphology We must not permit ourselves to be misled by momentary successes

If we analyze and critically examine our failures, further, if we thoroughly consider our successful results in order to find out why we succeeded, then we shall (1) improve our methods and attain still better results, (2) throw light upon some problems of late development The problem of *constitution* of the patient that considerably affects our results, has not yet been solved But experience shows that through operations properly carried out from the embryonic, physiologic and anatomic standpoints, we are able to alter the constitution to a certain degree, with special reference to late development of the face and skull in cases of cleft lip and cleft palate

If we cooperate with the morphologists, the prophetic words of my honored master, Victor Veau, will become true Veau said "I am convinced that history of development must become the leader of surgeons That procedure will be best, which follows embryonal development most closely" I should like to modify the latter sentence—on the basis of what I have previously said The best procedure will be that which follows *post*-embryonal development most closely

---

An Orthopaedic Approach to Problems of Cleft Lip and Palate. DENIS BROWNE, F R C S, *Surgeon to the Hospital for Sick Children, Great Ormond Street, London, W 1, England*

In the present organization of medicine, the correction of deformities involving muscles and bones is generally considered to be the responsibility of the orthopaedic surgeon, while deformities and deficiencies of the lip and palate are cared for by the plastic surgeon Now, in clefts of the lip and palate both muscles and bones are involved as well as skin and mucosa; yet the principles universally recognized to be applicable to muscles and bones elsewhere in the body are not usually applied here

These principles are

1 That displaced parts of bones should be replaced in their normal positions

2 That when replaced firm junction should be gained with the neighbouring bone

3 That when a muscle is divided the actual ends of that muscle should be joined together, and no inert tissue left between them

4 That when a divided muscle is joined it should be left in the position of contraction during healing

5 Before operating, to enable a muscular mechanism to work the exact mode of action should be studied

6 Muscle should not be cut, as this kills it

The cleft of the lip, floor of the nose, and alveolar ridge

I have set out my ideas of how these clefts should be prepared elsewhere Figures 145, 146 show a typical result in the severest degree of this deformity

The cleft of the hard palate

This is easily joined in most cases if the lateral portions are freely enough mobilized There are, however, certain clefts with a very wide U-shaped anterior end in which I think a good functional result is unobtainable



FIG 145 (left) Double hare-lip with displaced premaxilla and cleft palate before operation

FIG 146 (right) Same case after two operations the first to replace the premaxilla and the second to join the lip according to the formula mentioned This case is chosen because the line of the scar shows up particularly distinctly in a coloured skin

Discussion of Paper by Dr A. Solvio

ALFRED BERNDORFER M D, *Bencsur utca 39/a, Budapest VI Hungary*

Experiences gained during a long practice with more than 800 cleft lip-cleft palate operations and observations made as assistant to Victor Veau in Paris have taught me that the question of cleft palate is by no means solved by mere operations I am convinced that operations should be carried out primarily not for esthetic but for physiologic reasons As specialists we know that mere anatomic reconstruction is not sufficient to achieve normal palate function The goal of a cleft palate operation is to form for the individual a sufficiently mobile and long soft palate In cases of harelip we perform operations partly to restore normal esthetic appearance and partly however to shape the development of the face

It should not be forgotten that the aim of these operations is not a momentary success but that the late results must be favorable Experience teaches us that the late results often differ radically in different cases even where the same operative technique has been employed In many cases face and skull structure are favorable in others they are not Under such conditions months and years following operation deformities of the face and skull may be observed such as development of a high degree of asymmetry bending of the nasal septum stunting of the alveolar process and the previously normal looking lip becomes deformed

Development of the body after birth is influenced by external and internal factors Among external factors surgical interference must be mentioned first If no operation is done on a complete cleft lip-cleft palate the face becomes quite deformed. Operative interference thus guides future development and we should try to direct it normally The longer the reconstruction is postponed the more time we allow for degenerative development and after a certain time a normal reconstruction becomes impossible This means that cleft lip operations should take place at least within two or three weeks *after birth* i.e when the child has regained birth weight and its weight is increasing The palate should be closed long before the child begins to talk, i.e between the first and second year preferably in the first. The internal factors *influencing development* of the body are as yet for the most part unknown. We call them inclination, or constitution, or inheritance, but in reality we do not know what constitution actually means Experience and observation teach us that constitution continues to affect development after birth influencing the post operative shaping of the skull and face during further growth.

Some facts of this study are well-known by specialists. It is known that in some cases after a complete cleft palate operation one of the teeth usually an incisor erupts a few days or even hours afterward due to stimulation from the operation I once observed a complete dehiscence of the lip caused by such rapid eruption of teeth These teeth resemble those of 3 or 4 year old children In complete double cleft lips we note that the premaxilla which may protrude strongly before operation may assume a normal position shortly after anatomical reconstruction, without any active interference Cleft lip-cleft palate operations should be regarded as *comparable to orthodontic procedures, that is as* guiding or directing late development On the other hand it is known that operations which disregard normal anatomy and only try for immediate results produce great trouble in late development The ingenious method of Brophy has had irremediable late consequences by leading future development in the wrong direction. The method of Bardeleben also causes great difficulty in postoperative development in cases of double complete clefts Accessory incisions on the face and especially on the ala of the nose to produce a momentary good cosmetic result have proven to be harmful Every superfluous scar on the face or nose disturbs further normal development These unphysiological and unanatomical methods may produce first class results at the moment but if we look at the patient after months or years, we may be shocked at the deformation of the face nose lip and palate.

These experiences all teach us to keep the postoperative development in mind in planning our operation. After operation we must observe patients for months and years as an error in the operative method may unfavorably influence the desired normal development Normal development is based on embryology and our operation must conform to anatomical and

should be joined) a far more drastic freeing of the sides of the cleft is necessary than has previously been suggested This very free mobilization is also necessary to allow the palate to go backwards so that it can touch Passavants ridge in naso-pharyngeal closure It is to be noted that in all discussions I have heard on the points to be aimed at in the operation, the main desideratum for the palate is always stated to be its "length" It seems to me that however long the palate may be, if it will not touch the posterior wall of the pharynx it is not sufficient, and that the emphasis should be placed on how far back it is set

First stage operation of the soft palate

1 *Removal of tonsils* These are dissected out with the utmost care and delicacy The reason for this is that the relaxation incision is to be carried down through the empty fossa after it has healed over

2 *Division of posterior palatine artery* This is torn through by a dissector passed under it through a small incision to its outer side The effect is that there is much less bleeding when it is divided by the final relaxation incision, and there must be an increase of the blood supply to the anterior and posterior ends of the side of the cleft (as, for instance, the gluteal artery enlarges after division of the femoral)

Second stage operation of the soft palate

1 *Time of operation* This should be about three months after the first stage, and the two operations should be completed for choice at about the age of two At this time the child is large enough to make the operation fairly safe and easy, and yet bad habits of speech have not been acquired

2 *Anaesthetic* is gas and oxygen given through an intratracheal tube passed through the nose The anaesthetic is kept very light throughout, occasional gagging is no hindrance to the operation, and it is important that there should be an active coughing reflex immediately the tube is withdrawn

3 *Position* On the back with the shoulders well raised I find it a great help to have the head held absolutely still by a special "vice" with padded jaws in any operation on the head or face

4 *Gagging* A gag is, after all, only a special form of retractor, and I find the universal retractor I use in such varied operations as hernia, ligature of the ductus arteriosus, or mastoidectomy is better than any of the special ones designed for this operation Two screw-mounted blades working in opposition open the jaws, and two others retract the cheeks on either side Then the tongue is pulled out with a stitch deep into the muscle, which is fastened to the ring of the retractor Thus the whole region to be operated on is lifted up as near as possible to the surface of the body, and yet there is no tenseness of the naso-pharynx itself

4 *Relaxation incision* This is begun by incising with a diathermy needle along the line of the pterygomaxillary raphe A "needle-catching forceps" is thrust into this incision and opened to show a bloodless line of split The incision is then taken backwards just inside the alveolar ridge to the canine tooth The muco-periosteum is lifted off the bone by a dissector, and the posterior palatine artery, which will have reformed to some extent, divided The hamular process is broken off by slight pressure, and the incision carried down and back across the anterior pillar and the empty tonsillar fossa, close to the tongue In doing this the tissue to be divided is pulled well away from the lateral wall of the throat and seen to be clear of any large vessels before division

5 *Incision of the sides of the cleft* This is not the "freshening" so often described, but a deliberate deep incision to reach the ends of the sphincter which have already been identified in position When the sides of each incision are everted against each other by two rows of vertical mattress sutures, not only are the actual ends of the muscular gap in contact but there is a very wide area of contact between the raw surfaces, with a consequent high expectation of junction

6 *Passage of the circumpharyngeal suture round the back of the pharynx* This is done by means of a $\frac{3}{8}$ circle needle 6 cm long, with a rounded blunt point It is inserted through the lowest angle of the relaxation incision, and shuffled round by means of needle-catching forceps till its blunt end appears at the corresponding point to its entry on the opposite side This is quite an easy manoeuvre as described, but I know of no other way of doing it

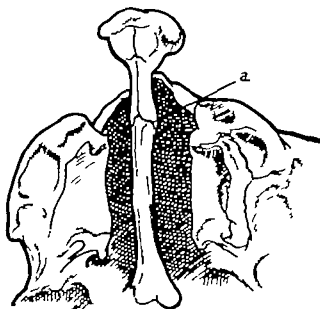


FIG. 147 Skeleton of double hare-lip with displaced premaxilla. (a) Shows the suture line between the vomer posteriorly and the pre-vomerine bone anteriorly It is the pre-vomerine bone alone which must be removed at operation.

I do not try for the construction of a complete mucosal lining for the nasal surface of the new hard palate as described by Veau. I find the nasal mucosa inextensible and friable so that I cannot in most cases obtain even the edge-to-edge junction which he described. However the ready covering of raw surfaces by mucosa, which has already been mentioned, seems to me to make this covering unimportant.

As compared with the junction described by Brophy there is the fundamental difference that whereas he got junction by swinging the mobilized sides downwards I get it by dragging them upwards I think it is this difference that accounts for contraction of the upper jaw after operation being much less in my technique than certain authors describe

The cleft of the soft palate

It is a strange fact that there is even now no agreement on how the naso-pharyngeal sphincter works (Ref 2) I have published my notion of how the large aperture of the naso-pharynx is closed by the muscles in the neighbourhood. This scheme has the following reasons in its favour

1 It gives the muscles of the region a logical reason for their existence.

2. The functions suggested for the muscles correspond to their nerve supply all those which close the opening being supplied by the pharyngeal plexus and the single one in opposition to the closure by the otic ganglion.

3 It gives an exact control of the soft palate, obviously necessary in accurate speech and even more in singing by means of the two pairs of muscles acting in opposition, the tensors and levators of the palate.

4. It does not call for an abnormal contractibility of the muscles engaged.

The only rival theory of closure, put forward by Dorrance Wardill and Whillis, is that there is a simple ring sphincter in this region. Apart from the fact that I cannot find such a muscular ring on dissection and have never seen a preparation demonstrating it, it does not fulfill any of the four conditions for a logical solution of the problem outlined above.

When a cleft palate is observed to gag the separated ends of the sphincter can be seen showing as temporary depressions at the points marked "e and e" on Fig 148 It is obvious that to fulfill the third orthopaedic condition mentioned at the beginning of this article (that is, that the actual ends of the gap in the muscle

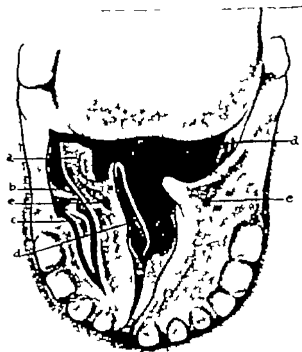


FIG 148 Cleft palate with left side prepared for suturing. (a) Empty tonsillar fossa. (b) Tendon of tensor palati running over displaced hamulus of pterygoid. (c) Cut posterior palatine artery (d) Edge of cleft of soft palate deeply split for suturing. (e) Dimples which mark ends of gap in naso-pharyngeal sphincter

thetic in almost all children, and I see no need for that

Results

To discuss and compare these properly would need far more space than I have available and far more investigation than I have time for The cases would need to be divided into classes according to

1 *The extent of the cleft*

2 *The general development of the parts involved, particularly the muscles of the pharynx and palate*

3 *The age of operation*

4 *The mentality of the child*, both in general intelligence and in sensibility to sounds of pronunciation

5 *The mentality of the parents* and the type of education given

6 *The standards of speech* required by the investigator

7 *The age of examination*

8 *The interval between operation and examination*

POINTS TO BE CONSIDERED

1 *Percentage of breaking down of the line of suture* It will be seen that it is impossible for the joined edges of the soft palate to come away from each other while the circumpharyngeal stitch is in position Therefore it is possible to get several hundred successive cases without a breakdown

2 *Need for speech training after operation* I have given this up as routine treatment for many years A child of normal mentality, with a cleft joined by this method spontaneously before bad habits of speech have been acquired, should learn to speak indistinguishably from its fellows

3 *Deformities of the alveolar arch* In partial clefts there should be no deformity at all, however early the operation is done In complete clefts, if an arch is formed before the cleft is joined, and skilled dental treatment is available, a good bite should result

Disadvantages of technique described

1 *Interference with the germs of the teeth* This must occur from the passing of the stitch which keeps the plate retaining the replaced premaxilla in position However, as all these cases must need a dental plate in adult life this is of no great importance

2 *Scar tissue along the line of incision* This is noticeable along the line of the pterygomaxillary raphe as an obvious band It does not seem to have any bad effects

3 *Division of the sensory nerves accompanying the posterior palatine artery* The anaesthesia so produced is merely temporary, and no bad effect has been noted

Factors against general trial of these methods

1 The formation of the floor of the nose looks too unlikely

2 The cutting of the prolabium looks far too drastic The commonest modification of my formula is to trim the prolabium into a rounded shield shape, instead of remorselessly cutting it into a triangle and removing all the mucosa If this is done, however, the formula will not work

3 Most plastic surgeons are unwilling to touch the tonsils Most oto-rhino-laryngologists, if given the task of removing them, in these cases leave very little palate behind

4 The dissection down into the throat looks more dangerous than it is but it needs a special study of the anatomy

5 The palate operation cannot be done with a Davis gag, which thrusts the whole pharynx downwards and immobilizes it so that the nasopharynx cannot be closed

6 The stitching recommended is extremely difficult or impossible to do with a Reverdin needle

REFERENCES

1 Browne, Denis Annals Royal College of Surgeons, Vol 5, 169-187, 1949

2 Browne, Denis British Journal Surgery, Vol 20, 7, 1932

3 Browne, Denis British Medical Journal, Vol 2, 1093, 1935

Un Traitement Orthopédique de la Division Palatine. DENIS BROWNE

Le problème des opérations de la division palatine consiste à permettre aux muscles qui doivent boucher le nasopharynx de remplir d'une façon correcte leur fonction On a suggéré que la meilleure façon d'y arriver était d'appliquer dans ces cas le principe universellement utilisé par les chirurgiens orthopédiques dans le traitement des sections musculaires au niveau de n'importe quelle partie du corps

7 *Suture of the posterior surface of the soft palate* This is done by vertical mattress sutures of linen inserted by a ½ circle 25 mm needle held in my needle-holder and pulled out by its tip by means of the needle-catcher

8 *Suture of the oral surface of the soft palate* This is done in the same way as the nasal surface by vertical mattress sutures with a twist added to keep the edges of the mucosa together

9 *Completion of the circumpharyngeal stitch* When the stitching of the nasal surface of the soft palate is half completed that is when it has reached the level of closure of the naso-pharynx, the end of the stitch which has been passed behind the pharynx is brought through both sides of the soft palate It is left loose and the suturing of the oral surface completed.

10 *Suturing of the hard palate* This is done by vertical mattress sutures Owing to the complete freeing of the sides of the cleft this is usually very easy and a wide strip of raw surface can be brought in contact Because of this wide

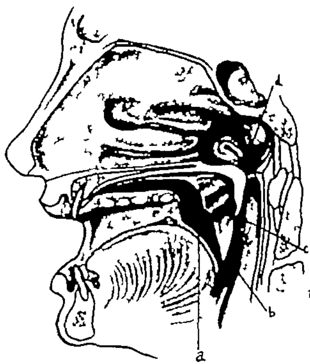


FIG. 150 Section of head to show effect of relaxation incisions and circumpharyngeal stitch. (a) Raw surface left by relaxation incision. (b) Posterior pillar of fauces. (c) Anterior pillar of fauces. (d) Section of circumpharyngeal stitch when tied

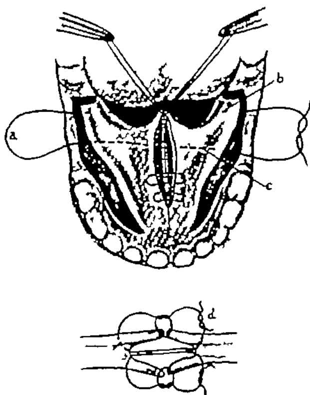


FIG 149 (a) Circumpharyngeal stitch (b) Circumpharyngeal stitch passing behind posterior wall of pharynx. (c) Circumpharyngeal stitch passing through palate whose posterior surface has been sutured. (d) "Over-and-over" stitch recommended for joining soft palate.

freeing there is also very little drag on the sides of the alveolar arch and consequently much less tendency to contraction than in the Brophy type junction. In a few cases in which the gap in the alveolus has not been brought together or in which the replacement of a displaced premaxilla has left a square anterior end to the cleft full closure of the anterior end is impossible at this operation and must be left to a secondary proceeding

11 *Tying the circumpharyngeal stitch* This should have the slack in it taken up and it is then tied in a treble knot. It should not be dragged very tight, which is a mistake I made in some of my early cases as this tends to raise a permanent ridge on the posterior wall of the pharynx.

12 *After treatment* The children are left to their own devices without syringing or other interferences. Owing to the lack of tension they are surprisingly comfortable and will usually eat and talk soon after the operation The circumpharyngeal stitch is left to absorb by itself and the linen ones to cut through and come away To remove them would need an anaes-

thetic in almost all children, and I see no need for that

Results

To discuss and compare these properly would need far more space than I have available and far more investigation than I have time for The cases would need to be divided into classes according to

1 *The extent of the cleft*

2 *The general development of the parts involved, particularly the muscles of the pharynx and palate*

3 *The age of operation*

4 *The mentality of the child,* both in general intelligence and in sensibility to sounds of pronunciation

5 *The mentality of the parents* and the type of education given

6 *The standards of speech* required by the investigator

7 *The age of examination*

8 *The interval between operation and examination*

POINTS TO BE CONSIDERED

1 *Percentage of breaking down of the line of suture* It will be seen that it is impossible for the joined edges of the soft palate to come away from each other while the circumpharyngeal stitch is in position Therefore it is possible to get several hundred successive cases without a breakdown

2 *Need for speech training after operation* I have given this up as routine treatment for many years A child of normal mentality, with a cleft joined by this method spontaneously before bad habits of speech have been acquired, should learn to speak indistinguishably from its fellows

3 *Deformities of the alveolar arch* In partial clefts there should be no deformity at all, however early the operation is done In complete clefts, if an arch is formed before the cleft is joined, and skilled dental treatment is available, a good bite should result

Disadvantages of technique described

1 *Interference with the germs of the teeth* This must occur from the passing of the stitch which keeps the plate retaining the replaced premaxilla in position However, as all these cases must need a dental plate in adult life this is of no great importance

2 *Scar tissue along the line of incision* This is noticeable along the line of the pterygomaxillary raphe as an obvious band It does not seem to have any bad effects

3 *Division of the sensory nerves accompanying the posterior palatine artery* The anaesthesia so produced is merely temporary, and no bad effect has been noted

Factors against general trial of these methods

1 The formation of the floor of the nose looks too unlikely

2 The cutting of the prolabium looks far too drastic The commonest modification of my formula is to trim the prolabium into a rounded shield shape, instead of remorselessly cutting it into a triangle and removing all the mucosa If this is done, however, the formula will not work

3 Most plastic surgeons are unwilling to touch the tonsils Most oto-rhino-laryngologists, if given the task of removing them, in these cases leave very little palate behind

4 The dissection down into the throat looks more dangerous than it is but it needs a special study of the anatomy

5 The palate operation cannot be done with a Davis gag, which thrusts the whole pharynx downwards and immobilizes it so that the nasopharynx cannot be closed

6 The stitching recommended is extremely difficult or impossible to do with a Reverdin needle

REFERENCES

1 Browne, Denis Annals Royal College of Surgeons, Vol 5, 169-187, 1949

2 Browne, Denis British Journal Surgery, Vol 20, 7, 1932

3 Browne, Denis British Medical Journal, Vol 2, 1093, 1935

Un Traitement Orthopédique de la Division Palatine. DENIS BROWNE

Le problème des opérations de la division palatine consiste à permettre aux muscles qui doivent boucher le nasopharynx de remplir d'une façon correcte leur fonction On a suggéré que la meilleure façon d'y arriver était d'appliquer dans ces cas le principe universellement utilisé par les chirurgiens orthopédiques dans le traitement des sections musculaires au niveau de n'importe quelle partie du corps

Ces principes sont les suivants

1 Définir l'action exacte des muscles en question L'accord n'est pas général actuellement sur ce sujet.

2. Réunir les extrémités réelles de l'ouverture dans les muscles sans laisser persister de tissu inerte entre ces extrémités. On ne peut arriver à ce résultat qu'en faisant une dissection musculaire beaucoup plus importante que celle préconisée jusqu'ici

3 Maintenir les muscles réunis en position de contraction au cours de la période de guérison. L'observation de ce principe pour ce qui est des muscles qui ferment le nasopharynx rend nécessaire le maintien du passage fermé à la fin de l'opération. On y arrive à l'aide d'un point au catgut qui encercle la totalité du mécanisme sphinctérien et qu'on laisse en place jusqu'à dissolution spontanée complète

Orthopädisches Angehen von Gaumenspalten. DENIS BROWNE.

Das Problem der Gaumenspaltenoperationen besteht darin, die Muskeln, welche den Nasopharynx schliessen sollten in die Lage zu versetzen, diese Funktion richtig auszuführen. Zur besten Erreichung dieses Zieles wird angeregt die Grundsätze zu beachten die ganz allgemein von orthopädischen Chirurgen bei der Behandlung geteilter Muskeln angewandt werden.

Diese Grundsätze sind

1 Die genaue Funktion der betreffenden Muskeln zu bestimmen gegenwärtig besteht diesbezüglich keine Übereinstimmung.

2 Die Muskelränder im Spaltbereich exakt zu vereinigen und kein funktionsloses Gewebe zwischen ihnen zu belassen. Dieses kann nur durch eine viel drastischere Freipräparierung, als je vorher empfohlen, erreicht werden.

3 Die vereinigten Muskeln während der Heilung in Kontraktionsstellung zu halten. Um dieses Prinzip auf die Muskeln die den Nasopharynx schliessen anzuwenden ist es notwendig am Ende der Operation den Durchgang geschlossen zu halten. Dieses wird dadurch erreicht, dass man den gesamten Sphinkter Apparat mit einem Katgut faden umkreist, der zur spontanen Resorption liegen bleibt

Un Aporte Ortopedico para el Tratamiento de la Fisura Palatina. DENIS BROWNE.

El problema en las operaciones de la hendidura palatina consiste en permitir que los musculos que deben cerrar la nasofaringe ejecuten esta función adecuadamente se ha sugerido que esto puede ser mejor hecho aplicando a ellos los principior que son universalmente usados por los cirujanos ortopedistas en el tratamiento de los músculos divididos en cualquier otro sitio

Estos principios son

1 Definir la acción exacta de los músculos por tratar no hay en el momento presente ninguna regla sobre esto

2 Juntar los extremos de la brecha muscular no dejando tejido injerte entre ellos. Esto puede ser mucho mejor que la que se habrá efectuado a la fecha, únicamente mediante una drástica disección para leberarlos.

3 Dejar los musculos unidos, en posición de contracción durante la curación. Para observar este principio con los mulos que cierran la nasofaringe es necesario dejar el pasaje ocluido al final de la operación. Esto es hecho empleando un cat-gut que incluye el mecanismo esfinteriano total y es dejado para reabsorberse expontáneamente.

The Velopharyngoplasty WOLFGANG ROSENTHAL, Dr Med., Professor, *Robert Kochplatz 9, Berlin NWF, Germany*

It is well known that a functional velum insufficiency results from congenital shortening of the velum, from submucous cleft palate or from mutilation, cicatrization or partial loss of the velum following operations

There are also cases of velum paralysis causing functional insufficiency

The troubles caused by velum insufficiency are typical. They consist especially of difficulties in deglutition and speech.

Many therapeutic attempts have been made to correct these difficulties Most of them are compiled in "The Operative Story of Cleft Palate" by George Morris Dorrance Philadelphia

In the long run the velopharyngoplasty alone proved appropriate. It can be executed in two ways A sufficiently broad muscular-mucous flap from the pharyngeal wall is turned upward and united with the sutured velum parts (Schönborn Rosenthal) or the pharyngeal flap is turned downward (Sanvenero-Rosselli)

Both methods have given good functional results * Recently R. Trauner of Graz returned to the idea of Passavant. He performs an artifical closure of the velum, leaving the patient only a median aperture for breathing

When I performed a velopharyngoplasty for the first time, my reasons were less mechanical ones. At this time (1915-1916) I was occupied with an investigation of the muscular neurotization.

A student of medicine with a completely

* Padgett, Arch of Surgery Vol. 20 1930

mutilated velum was sent to me by the anatomist Spalteholz, of Leipzig This young man spoke very indistinctly and therefore had been dissuaded from his studies His velum was totally paralyzed, but the posterior pharyngeal wall seemed to be innervated

I took a muscular-mucous flap from the pharynx in order to obtain a muscular neurotization of the immobile velum parts The success obtained was an astonishing one The student, who had been dissuaded from his studies, is to-day an experienced physician at Zwickau-Saxony He speaks normally Nobody would suspect the cleft palate Encouraged by this success, I applied that method not only in cases of velum shortening but also in two cases of velum paralysis remaining after diphtheria

Time of operation not before age of twelve Anaesthesia local anaesthesia and sedation Procedure the muscular-mucous flap must be sufficiently broad and cut in such a way that the fascia praevertebralis is exposed Closure of the pharyngeal defect by catgut sutures is necessary

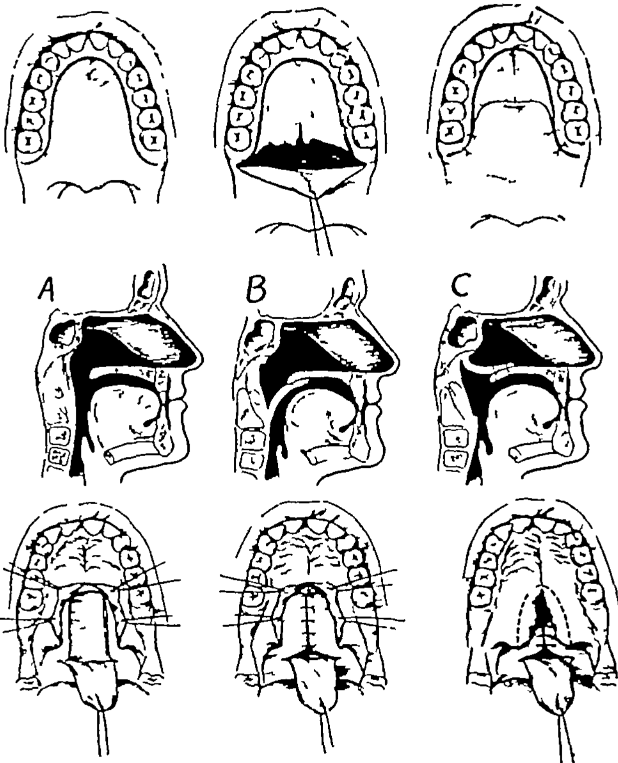


Fig 151 (top row) Push-back-operation (Dorrance)

Fig 152 (center row) A Short velum B Pharyngeal flap put up C Pharyngeal flap put down

Fig 153 (bottom row) Pharyngeal flap, method Rosenthal

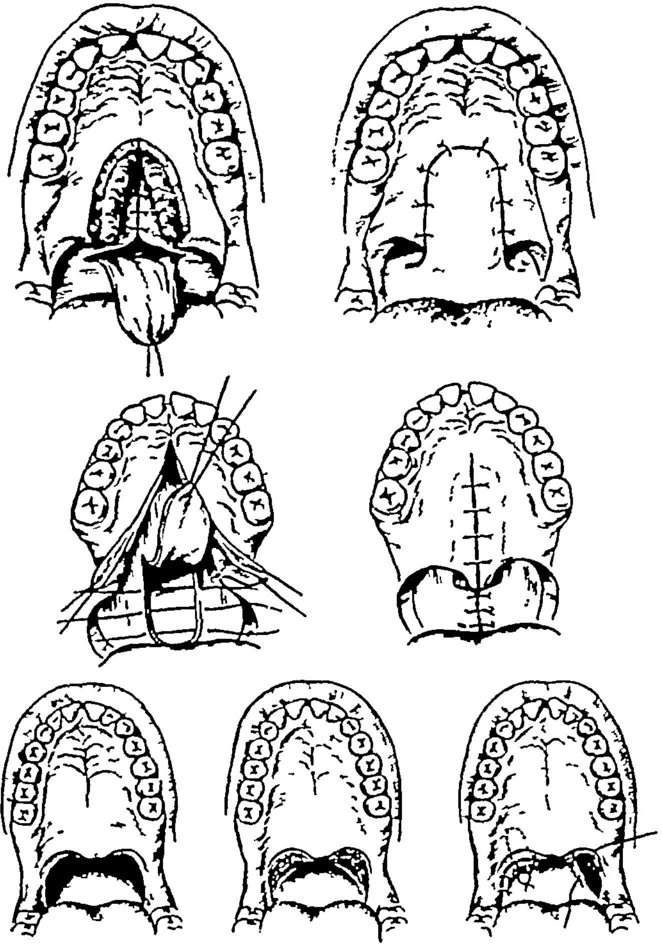


Fig 154 (top row) Pharyngeal flap fixed on short velum

Fig 155 (center row) Pharyngeal flap put downward (Sanvenero-Rosselli)

Fig 156 (bottom row) Method Trauner (modified by Rosenthal)

It is not true that I leave unclosed the wound of the pharyngeal wall, as has been said On the contrary, I attached from the beginning great importance to mesopharyngo-constriction That can be obtained by suturing the pharyngeal wound at a point of importance for articulation The nourishment of the pharyngeal flap does not suffer from suture of the pharyngeal wound The velum must be well prepared for the application of the pharyngeal wall flap

The prognosis is good, if the procedure is executed properly Complications or deaths did not occur, either in my own cases nor in those of my collaborators

With regard to the speech of the patients, the success of the intervention is very appreciable

La Velopharyngoplastie. Wolfgang Rosenthal

L'histoire de la fermeture pharyngée dans la division palatine est bien connue, aussi l'auteur ne

commence-t-il son exposé qu'avec son premier cas en 1916 L'indication à l'acte chirurgical était tout à fait différence de ce qu'elle est habituellement paralysie totale du voile et innervation apparente du pharynx postérieur chez un étudiant. Une opération avait été effectuée sans succès sur le palais mou L'auteur préleva un lambeau musculomuqueux sur le pharynx de façon à obtenir une innervation musculaire des parties immobiles du voile Le succès fut étonnant l'étudiant à qui on avait déconseillé de poursuivre ses études est actuellement un médecin plein d'expérience qui exerce à Zwickau (Saxe Allemagne) Il parle normalement personne ne pourrait soupçonner la paralysie du palais Encouragé par ce succès l'auteur a appliqué cette méthode non seulement dans le cas de voile du palais court mais aussi dans 2 cas de paralysie du voile après diphtérie

Schlundwandplastik bei Gaumenspalte. WOLFGANG ROSENTHAL.

Da die Geschichte der Schlundwandplastik bei Gaumenspalte wohlbekannt ist, will ich mit meinem 1 Fall aus dem Jahre 1916 beginnen. Die Indikation für einen chirurgischen Eingriff war ungewöhnlich es bestand eine totale Lähmung der Velumreste im Gegensatz dazu aber eine un *gestörte Innervation der Pharynxwand* bei *einem* Studenten. Er war erfolglos wegen Velum Gaumenspalte operiert worden Ich nahm einen Schleimhautmuskellappen aus der Pharynxwand mit der Absicht, eine muskuläre Neurotisation der unbeweglichen Velumreste zu erreichen. Der Erfolg war überraschend. Dieser Student, dem von der Fortsetzung seines Studiums abgeraten worden war ist heute ein erfahrener Arzt in Zwickau (Sachsen) Er spricht normal Niemand würde ihm eine Gaumensegellähmung und einen Spalt gaumen anmerken. Ermutigt durch diesen Erfolg wandte ich meine Methode nicht nur bei Fällen von zu Kurzem Velum sondern auch bei zwei Patienten mit Dauerlähmung nach Diphterie an.

La Velofaringoplastia WOLFGANG ROSENTHAL.

La historia de la oclusión faríngea en la fisura palatina es muy conocida así que iniciaré con mi primer caso en 1916 La indicación quirúrgica era diferente de lo usual parálisis total del velo y aparente inervación de la faringe posterior en un estudiante La operación había sido efectuada sin éxito en el paladar blando Tomé un colgajo musculo-mucoso de la faringe para obtener la neurotización muscular de las partes inmóviles del velo El éxito fue sorprendente Este estudiante que había abandonado sus estudios es ahora un médico experimentado en Sajonia Habla normalmente nadie imaginaría el paladar paralizado Animado por ese éxito apliqué ese método no solo en un caso de velo corto sino tambien en dos casos de parálisis del velo consecutiva a difteria.

Inferiorly Based Pharyngeal Flap in the Speech Rehabilitation of Complicated Cleft Palate Cases. HERBERT CONWAY, M D AND RICHARD B STARK, M D, *Department of Surgery (Plastic) of The New York Hospital—Cornell Medical Center, New York, New York*

In a small percentage of those patients who have defective speech following surgery for cleft palate it is impossible to retrodisplace the palate by operation so that there is effective apposition of the soft palate to the posterior pharyngeal wall The shortened antero-posterior dimension of the palate allows the escape of the outgoing column of air through the nose with resultant nasality of speech. Such a patient is incapable of forming the glottic stops necessary if the sounds of consonants are to be produced. The authors feel that the pharyngeal flap procedure designed to attach the velum to the posterior pharynx is a most valuable method of combating velo-pharyngeal insufficiency with its attendant imperfect speech.

The physiology of the soft palate and its role in the closure of the oral-nasopharyngeal aperture during the emission of the guttural components of speech have been understood for many years. Sandifort,[1] in 1805 published anatomical drawings of sagittal sections of the head which showed the soft palate at rest and in approximation to the posterior pharyngeal wall during speech

Dorrance[2] and others have studied pharyngeal musculature not only from its oral view but also by direct vision from above. Cases in which the facial structures have been removed for carcinoma have provided clinical material for these studies. During the physiology of speech, the soft palate rises and extends backward until the papilla of the velum is in apposition with the posterior pharyngeal wall Excellent animate cineradiographic studies of this function have been made by Calnan, who pointed out that the levator papilla on the nasal side of the soft palate points toward the posterior pharyngeal wall at a level somewhat higher than that at which Passavant's horizontal ridge is located It was Calnan's[3] conclusion that Passavant's ridge came into play in the gag reflex and is not particularly concerned with the

mechanism of speech Tomography and cineradiography performed by the authors upon patients with normal speech and upon patients with defective speech in association with cleft palate have led the authors to the same conclusion

Experience with 517 cases of congenital cleft of the palate during the past 20 years at The New York Hospital-Cornell Medical Center has shown that incomplete clefts of the palate (clefts of the soft palate or of the soft palate and the posterior portion of the hard palate) usually exhibit associated congenital shortening in the antero-posterior dimension Some of the established techniques of suture directed at the approximation of the margins of the congenital cleft are not designed to correct this antero-posterior shortening One such technique is that of von Langenbeck (Dieffenbach-Warren) which is in popular use by many American surgeons at the present time The von Langenbeck suture is objected to not only because it fails to effect retrodisplacement of the soft tissues of the palate but also because unepithelialized areas usually are left on the nasal surface of the mucoperiosteal flaps Healing of the operative site results in postoperative scarring and contracture in both horizontal and longitudinal planes This procedure fails to close alveolar clefts effectively and therefore leaves a high percentage of the patients with rhino-oral fistulae The percentage of patients in whom perfect or acceptable speech follows the repair of cleft palate is listed by various authors in the neighborhood of 75 per cent

This report is concerned with the group of cases in which there has been failure of attainment of acceptable speech These patients may exhibit the following types of palatal defect following palatal suture (a) a low palatal arch with undue horizontal tightness of the sutured velum, (b) inadequate antero-posterior measurement of the palate with an abnormally great distance from the palatal arch to the posterior pharyngeal wall (often measuring 2 5 cm and in some cases as much as 4 cm), (c) excessive scarring and thickening of the soft palate (due to multiple operations) which prevents physiologic levator action of the velum, and (d) loss of substance of the velum due to postoperative slough

In an attempt to meet the problem of velopharyngeal insufficiency with impairment of speech, one group of clinicians became convinced that any surgery on the palate was contraindicated before full growth was obtained These men resorted to the use of artificial vela constructed of plastic material (vulcanite or acrylic) In our clinic these removable prostheses have been objected to because they impose an undue burden upon the teeth which retain them, because they demand that the individual rely upon an intraoral crutch which is cumbersome as well as expensive, and because they often cause lymphoid hypertrophy, chronic congestion of the nasal and pharyngeal mucous membranes, and chronic pharyngitis These developments contribute to symptomatic halitosis and to the occurrence of frequent upper respiratory infections The eventual loss of the key teeth which structually support the prosthesis may prove to be a devastating blow to the hapless patient

Several surgeons attempted to combine the use of surgery with the use of an artificial obturator Passavant[4] (1878) and Gareil[5] (1894) used a collar button-type of obturator to close the defect in the hard palate, suturing the soft palate behind A similar procedure was performed by Pickerill[6] (1912) combining palatoplasty with the use of a prosthesis A not dissimilar method of solving this problem was that of Sir Harold Gillies and Kelsey Fry[7] (1921) Early attempts to lengthen the palate consisted of suturing the palato-pharyngeal muscles together, thereby lengthening the velum This was done by Passavant[8] (1865), Whitehead[9] (1871), Morestin[10] (1910), Helbing[11] (1912), and Makuen[12] (1915) Others attempted to lengthen the soft palate by lengthening the uvula as Mirault[13] had done for a cleft of the lip This consisted of incising the uvula horizontally and letting it hinge backward forming a V This was done by Kuester[14] (1882), by Blair[15] (1911), and by Remijnse[16] (1923) Palate lengthening operations of a different sort consisted of rotating two flaps, based posteriorly, toward the midline and suturing them in that position This was advocated by H L Smith[17] (1895) and by Goyder[18] (1913) Following Ganzer's pushback operation, Ljvov[19] (1925) utilized this W type incision anteriorly with elongated lateral incisions similar to those utilized in the von Langenbeck procedure Veau[20] (1931) employed a

similar anterior W incision. This was adopted at about the same time by Wardill.[21] Halle[22] (1925) combined the narrowing of the pharynx with the von Langenbeck type of palatal repair severing the anterior attachments of his flaps and displacing the palate posteriorly at a second operation. Blair[23] (1922) covered the anterior part of the palate with a pedicled flap from the cheek (which was turned into the mouth through a lateral cheek incision, allowing the velum to drop backward) Padgett[24] (1922) utilized the same technique in conjunction with the Limberg procedure (removing the neurovascular bundle from its bony canal and allowing it to drop backward with the palate) Limberg[25] (1927) utilized the Ganzer W shaped incision to form his mucoperiosteal flaps and resected the vessels and nerve from the greater palatine foramen. He combined these steps with an interlaminar osteotomy of the pterygoid process.

Dorrance[26] (1925) utilized a semicircular relaxing incision posterior to the alveolus. At the same time he sectioned the hamulus The tensor veli palatini became the hypotenuse of a triangle lengthening that muscle and making it synergistic with the levator To line the nasal side of the palate Dorrance and Bransfield[27] (1943) described a two-stage operation utilizing an inlay skin graft. This step was combined with the push-back operation described earlier by Dorrance. *A similar push-back operation* had been advocated as a one-stage procedure by Brown[28] (1936) who stretched the palatine vessels from their rigid canals in the palatine bones Marino[29] (1944) and Conway[30] (1947) described one-stage push-back operations in which the step described by Limberg was applied. The surgical release of the palatine neurovascular bundle from its bony environment allowed the velum and the muco-periosteal flap to swing backward with ease as the lateral and superior attachments of the palatine musculature and the superior origins of the palatine arteries veins and nerves acted as a pendulum for support and nutrition. Baxter and Cardoso[31] (1947) described a push-back procedure which modified that used by Dorrance An inlay skin graft was inserted under the muco-periosteum in a *primary* operative procedure and the palate was set backward at a subsequent operation.

Another group of surgeons concentrated their attention upon the posterior pharyngeal wall and devised techniques to move it forward in an attempt to narrow the velopharyngeal gap. Passavant[32] (1865) folded a flap of pharyngeal mucosa and submucosa upon itself building thereby a shelf which projected forward from the posterior paraffin wall. Gersuny[33] (1900) injected soft paraffin into the retropharyngeal space. The injection of hard paraffin into the same location was described by Eckstein[34] (1902) It was reported by Halloweg[35] (1912) that Perthes had inserted a piece of cartilage behind the posterior pharyngeal wall through an extra-oral approach. A similar approach was used by von Gaza[36] (1926) who placed fat fascia into the retropharyngeal space, entering the neck from the superior lateral triangle. In 1925 Halle[22] used fascia for this purpose. Woods[37] (1927) injected paraffin into the posterior pharyngeal wall and combined it with the Rutenberg method of pharyngoplasty Hynes[38] (1950) developed two superiorly based flaps, consisting of the salpingo-pharyngeal muscles with their overlying mucosa, which he interdigitated horizontally across the wall of the posterior pharynx at a level higher than Passavant's ridge. This operative procedure provides bulk in the area apposed by the soft palate. Closure of the lateral pharyngeal donor sites from which the flaps are elevated, brings about medial displacement of the lateral pharyngeal walls.

A number of procedures have been designed to narrow the diameter of the pharynx. Rutenberg[39] (1876) and Wardill[40] (1927) narrowed the pharynx by incising the posterior pharyngeal wall horizontally and suturing it vertically Botey[41] (1907) excised two vertical ellipses from the postero-lateral pharyngeal wall and closed these incisions. Ernst[42] (1925) undermined the lateral and posterior pharyngeal walls packing them with iodoform gauze so as to narrow the diameter of the pharynx. Kirschner[43] (1925) dissected the lateral walls of the pharynx producing narrowing of the pharynx by granulation tissue Kirkham[44] (1927) narrowed the pharynx by suturing the superior constrictor to the palato-pharyngeal muscle Precechtel[45] (1929) fractured the pterygoid process bilaterally and packed the spaces for three weeks so as to medially displace the soft palate. Rethi[46] (1932) narrowed the pharynx by utilizing a

flap of mucosa and submucosa taken from the posterior pharynx and suturing it to the palato-pharyngeal arch, operating upon one side at a time

A fourth group of surgeons designed operations which attached the velum to the posterior pharyngeal wall The first surgeon to perform such an operation was Passavant[47] (1865) who sutured the velum to the posterior pharynx A true pharyngeal flap, as we know it today, was performed by Schoenborn[48] in 1875 "I cut at the posterior pharyngeal wall an oblong flap, its longitudinal axis medianly, its base down, about 2 cm wide, and 4 to 5 cm long The flap has to start as high up as possible at the posterior pharyngeal wall, so that it reaches, after separation, comfortably and without the slightest tension, at least as far as the posterior margin of the hard palate The incision cuts through the mucosa and the muscles underlying it Then, the mucoperiosteal cover of the palate is separated sufficiently in the usual manner, and it and the soft palate are sufficiently mobilized Then I cut off the corners of the flap taken from the posterior pharyngeal wall, thus giving its upper end a triangular shape, and sutured it between the two halves of the soft palate When the patient woke from chloroform anesthesia, her speech was tested immediately and was found to be very much more clear than before the operation" Schede[49] (1889) utilized a flap similar to that used by Schoenborn Rosenthal[50] (1924) utilized the same type of procedure with an inferiorly based flap, used primarily in conjunction with a von Langenbeck type of closure Fruend[51] (1927) utilized an inferiorly based flap at the time of primary repair of the palate He divided the flap at a later date, leaving an inert appendage attached to the uvula The technique of the pharyngeal flap was utilized by Padgett who left the flap attached permanently This did not interfere with the physiology of the velopharyngeal area Padgett and Stephenson[52] (1948) published a series of cases with the flap based superiorly Moran[53] (1951) performed the pharyngeal flap operation in 35 cases with excellent speech resulting in 8, good speech resulting in 15, and fair or improved speech in 8 In most of these cases the pharyngeal flap was based inferiorly, but Moran favored a superiorly based pharyngeal flap if the velopharyngeal aperture were greater than 2 cm or in young subjects if excessive adenoid tissue was present. Dunn[54] (1951) reported that speech was improved in 29 of 30 cases in which the pharyngeal flap operation was carried out by Moran's technique Conway[55] (1951) published a series of 21 cases in which a pharyngeal flap was used In eight of these, it was used in combination with the push-back operation, and excellent speech resulted in all

Operative Technique

As the result of increased experience, the authors are resorting more frequently to the immediate use of the pharyngeal flap at the time of primary repair of the cleft palate The type of palatal repair preferred is that of Ganzer This is employed in complete clefts if the anterior portion of the hard palate and of the alveolar ridge have been closed at the time of repair of the cleft lip Closure of the anterior palate is accomplished usually by means of a vomerine flap The Ganzer procedure is utilized in association with fracture of the hamular process and closure of the nasal mucous membrane as advocated by Kilner Before the soft palate is closed, however, an inferiorly-based pharyngeal flap (including the mucous membrane, submucosa and the sub-adjacent superior constrictor muscle) is dissected from the prevertebral fascia The donor defect is closed by primary suture of the lateral margins of the defect Narrowing the transverse diameter of the pharynx results After closure of the velum, a raw surface is created on the oral aspect of the uvula and velum by turning the mucous membrane backward as a gate or hinge flap The inferiorly based pharyngeal flap is sutured to this raw surface Closure of the nasal mucosa is intended to prevent subsequent anterior displacement of the operatively retrodisplaced palate by the avoidance of raw areas which inevitably must heal by cicatrization

Data (Table 1)

Over a period of the last twenty years (1935-1955) 517 cases of cleft palate have been managed at the New York Hospital-Cornell Medical Center In a group of patients who have exhibited faulty speech despite adequate speech therapy, 81 have undergone the pharyngeal flap operation Of this group of 81 patients, only 10

TABLE 1 SPEECH RESULTS FOLLOWING PHARYNGEAL FLAP PROCEDURE IN 81 CLEFT PALATE CASES WHICH HAD PERSISTENTLY DEFECTIVE SPEECH FOLLOWING CLEFT PALATE REPAIR AND ADEQUATE SPEECH THERAPY

Type of operation	No. cases	Functional results: Perfect speech	Functional results: Speech less than perfect	Complications
Pharyngeal flap (based superiorly)	4	2	2	
Pharyngeal flap (based inferiorly)	47	34	13	7
Push-back operation combined with pharyngeal flap (based inferiorly)	30	28	2	
Total	81	64(79%)	17(21%)	7

have had primary surgery performed at this center Surgery was performed in other hospitals on the remaining 71 patients The number of previous operations that had been undertaken in this group averaged 2.6 In a few patients as many as 9 or 10 previous operations had been performed in one patient 14 operations had been carried out by six different surgeons. The average age of the patients in this series was 10.9 years Forty-one of this group were female and forty were male Fifty-one of the patients had complete clefts of the palate while thirty had incomplete clefts. In the group with complete clefts, there were 19 females and 32 males In the group with incomplete clefts, there was a predominance of females 22 being female and only 8 male This is in agreement with Fogh Andersen's[34] data that an incomplete cleft of the palate is fundamentally a female anomaly In 51 of this series (the earlier cases for the most part) rehabilitation was attempted through the use of the pharyngeal flap operation alone whereas in 30 others, the pharyngeal flap operation was combined with the push-back procedure In only 4 of the 81 patients was the flap based superiorly Preoperatively the measured distance from the arch of the soft palate to the posterior pharyngeal wall varied from 1 to 4 cm but in all of these there was inability to direct the outgoing column of air through the mouth with resultant nasalization of the speech (rhinolalia aperta) Following rehabilitation with the pharyngeal flap procedure 64 of the 81 patients or 79 per cent exhibited acceptable speech. In

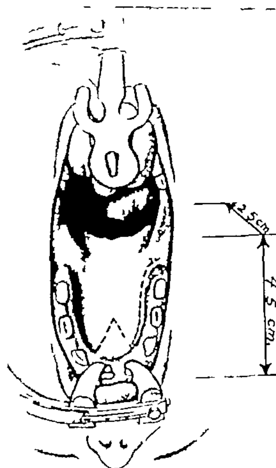


FIG. 15[7] With intratracheal tube for anesthesia held over the central portion of the tongue by the mouth retractor incision is made into the mucoperiosteum overlying the hard palate. Either the Wardill incision as outlined above or the Dorrance "horse shoe type of incision may be used. In a typical case of congenital antero-posterior shortening of the palate the distance from the posterior margin of the upper incisors to the arch of the shortened palate is 4.5 cm and the measurement from the latter point to the posterior pharyngeal wall is 2.5 cm. However these measurements vary with the age of the individual the size of the oral cavity the shortening, fibrosis or loss of soft tissue

creased experience has led the authors to the conclusion that the pharyngeal flap is most effective when it is based inferiorly and when it is combined with the push-back operation.

COMPLICATIONS

Complications have occurred in seven of the 81 cases (8 7 per cent) In two of these the pharyngeal flap pulled away from the palate necessitating reattachment. In two others the pharyngeal flap was too wide so that there was interference with the physiology of the eusta



FIG 158 After the mucoperiosteum has been elevated from the horizontal plate of the maxilla, it is retracted in the midline and divided horizontally so that the soft tissue floor of the nasopharynx is left intact In cases in which there is a high arch to the palate, those in which intra-oral exposure is difficult, and in those in which there is excessive fibrosis, this may be a difficult, although an important, operative step

chian tubes In one instance it was necessary to narrow the pedicle, in the other, the pedicle was detached from the pharynx but left attached to the soft palate Spontaneous separation of one of the flaps was due to necrosis at its tip The flap was reattached successfully later In one case there was postoperative hemorrhage from the donor site which was controlled by packing with oxidized cellulose In another instance, postoperative respiratory difficulty necessitated tracheotomy In the seventh case there was an atlanto-axial dislocation which was corrected uneventfully by the application of head traction by means of Crutchfield tongs This serious complication was due to over-extension of the neck during operation

Discussion and Conclusions

The problem of maintaining the antero-posterior length of the palate in complicated cases of cleft palate is not a simple one, as is demonstrated by the plethora of operations devised for its correction Except for a few reports in recent years, accurate data on the number of cases treated by various methods and convincing evidence as to the equality of speech obtained are not available in the surgical literature Thus, the surgeon, who is confronted with the responsibility of habilitation of a patient whose faulty speech has followed multiple unsuccessful operations on the palate, is confronted with one of the most difficult assignments in reconstructive surgery

The student of the physiology of speech might assume that the superiorly based pharyngeal flap would perform better than one which is based inferiorly as the former more nearly appears to simulate the levator action of the musculature of the palate In our cases, however, the use of the inferiorly based flap was rewarded by attainment of normal speech in 79 per cent of complicated cases, a percentage higher than that attained by any other method in our clinic Our experience with the inferiorly based pharyngeal flap over the past 9 years has brought us to a new appreciation of its role in the production of speech

In the first place, this permanent structure, bridging the nasopharyngeal aperture in an oblique fashion, diverts the outgoing column of air through the oral pathway in much the same way that a sounding board diverts speech from the speaker's rostrum to the audience In addition, the inferiorly based pharyngeal flap maintains the operative retrodisplacement of the soft palate achieved by the Ganzer-type of push-back Also, closing the donor area of the flap results in medial displacement of the lateral portions of the pharynx, thereby narrowing the transverse diameter of the pharynx in a manner akin to that of the earlier pharyngoplasties The pharyngeal flap creates two, small lateral pharyngeal apertures which lead to the orifices of the eustachian tubes These two pharyngeal apertures replace the single larger velopharyn-

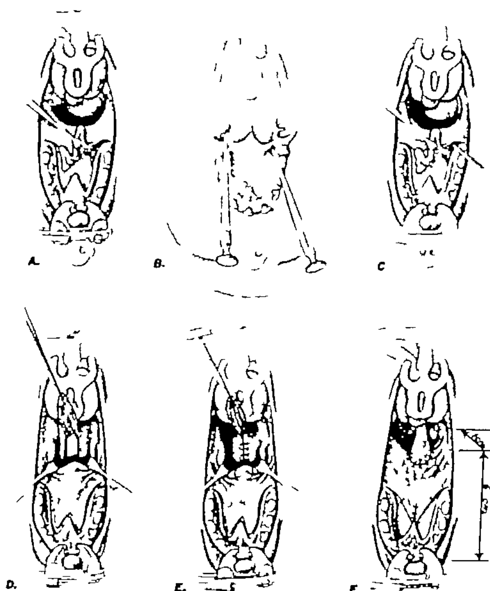


FIG 159 (a) As the dissection is carried down toward the posterior extension of the horizontal plate of the palatine bone, the neurovascular palatal bundle is exposed as it emerges from the palatine canal. (b) Anatomical diagram to show how a chisel is used to divide the hamular process as shown on the left and again to chip off the thin posterior wall of the bony palatine canal (right) (c) Anatomical sketch showing the position of the chisel as it frees the palatine neurovascular bundle. (d) The shortened velum is retracted anteriorly so that the muco-muscular pharyngeal flap can be elevated. In the floor of the wound the prevertebral fascia presents. (e) Closure of the defect in the posterior pharyngeal wall from which the pharyngeal flap has been elevated is looked upon as an important step since this closure produces forward displacement of the posterior pharyngeal wall and medial displacement of its lateral walls. An incision is made on the oral aspect of the velum so that a gate-like flap can be elevated and rotated for the acceptance of the pharyngeal flap (f) The palate falls easily into a more posterior position, which is secured by suturing the pharyngeal flap to the wound on the oral aspect of the velum. Usually 1.5 to 2 cm. of retro-displacement is accomplished thus elongating the palate and diminishing the antero-posterior dimension of the velopharyngeal area. The inferiorly based pharyngeal flap creates two small velopharyngeal openings leading to the area of the eustachian tube.

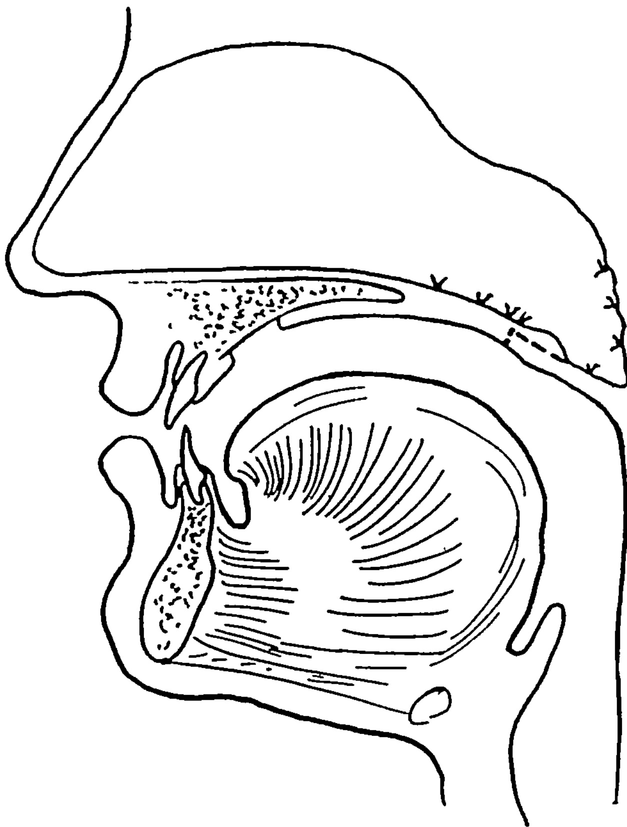


FIG 160 Artist's conception of the sagittal section of the inferiorly based pharyngeal flap after suture to the velum The raw area on the nasal aspect of the retrodisplaced soft tissue is closed by undercutting and suture of the nasal mucosa Sutures are shown in the posterior pharyngeal wall as the defect left after elevation of the pharyngeal flap closed Occasionally one suture is used to convert the pharyngeal flap into a tube although this is not considered to be an important detail of operative technique

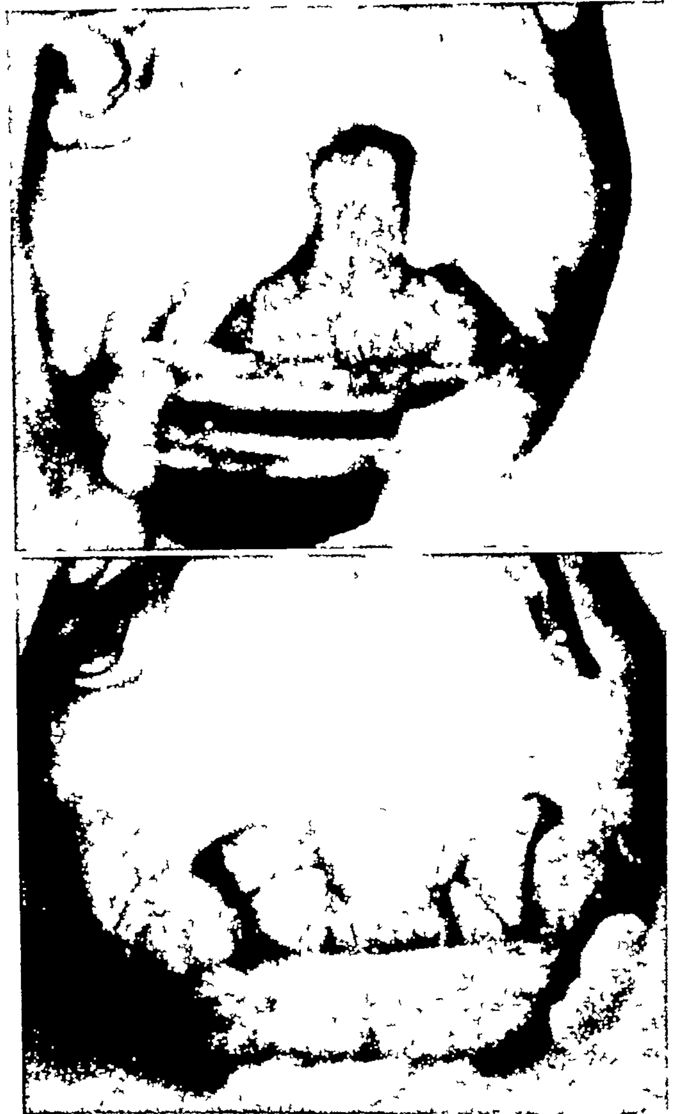


FIG 162 (top) Shortened, scarred, fibrotic, immobile soft palate with central loss of tissue due to slough Five previous operations had been carried out unsuccessfully in an attempt to repair this palatal defect (Bottom) Postoperative appearance of this child's mouth after the combined use of the push-back operation and the pharyngeal flap In the upper part of the photograph the flap holds the soft tissues of the palate permanently in their position of retrodisplacement

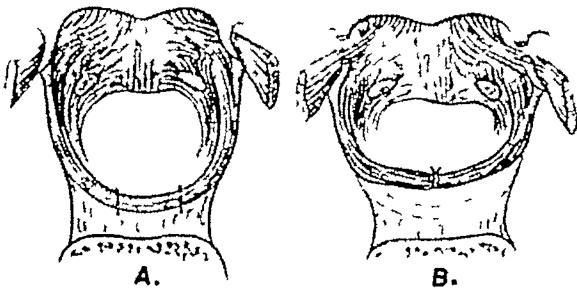


FIG 161 (A) Diagrammatic cross-section of the posterior pharynx just above the glottis The dotted lines indicate the approximate relative dimensions of the pharyngeal flap (B) Artist's impression of the effect of closure of the defect in the posterior pharyngeal wall by undercutting and suture of the lateral musculature

geal orifice By medial movement, the lateral pharyngeal walls approximate the pharyngeal flap, thereby partly substituting pharyngo-pharyngeal for velo-pharyngeal closure The tongue rises up also and helps to occlude these two small apertures (glosso-pharyngeal closure) The inferiorly based pharyngeal flap allows the tongue to more effectively perform this glosso-pharyngeal closure

In four of the cases in which socially acceptable speech was not obtained by the combined use of the push-back and the pharyngeal flap proce-

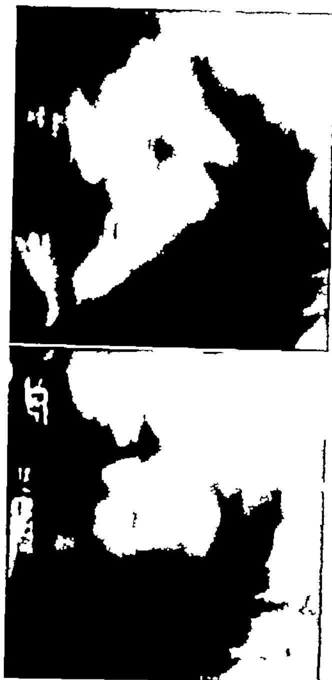


FIG. 163 Tomogram of a patient on whom a pharyngeal flap has been done At top the palate is at rest At bottom the patient is making a plosive sound and the space between the tongue and the pharyngeal flap has been diminished greatly as well as that between the flap and the posterior pharyngeal wall



FIG 164 (top) Photograph of a shortened, tight velum in a patient who had undergone an unsuccessful push-back procedure at the age of eight years. Note the abnormally great measurement between the posterior portion of the soft palate and the posterior pharyngeal wall The exudate is evidence of chronic pharyngitis. (Bottom) After the performance of the combined push-back and pharyngeal flap procedures the flap effectively holds the soft palate in retrodisplacement. There are now two nasopharyngeal apertures each measuring only 1 cm. in antero-posterior dimension The chronic pharyngitis is no longer in evidence

dures followed by additional speech training the pharyngeal flap was dismantled and pharyngoplasty of the type recommended by Hynes was employed. In these cases the salpingopharyngeal muscles were developed as mucosally covered flaps and were rotated at right angles to the transverse position across the posterior pharyngeal wall. In all four of these cases the speech deteriorated further and in spite of intensive speech therapy never approximated that achieved following the pharyngeal flap procedure

Data have been presented upon 81 cases of complicated cleft palate in which there was significantly defective speech. In 30 of these cases push-back operations of the Ganzer type were combined with the use of an inferiorly-based pharyngeal flap In 51 pharyngeal flaps alone were utilized. In 47 the pharyngeal flap was based inferiorly Sixty four or 79 per cent of these patients achieved speech which was acceptable socially Seven complications are listed.

The inferiorly based pharyngeal flap substitutes glosso-pharyngeal and pharyngo-pharyngeal closure for velo-pharyngeal closure and closure of the pharyngeal donor site of the flap by suture of its two lateral margins to each other serves as an effective auxiliary pharyngoplasty The inferiorly-based pharyngeal flap appears to direct the column of outgoing air through the mouth more effectively than does that which is based superiorly In the correction of the speech deformity of the complicated cleft palate case the authors recommend the use of the one-stage push-back operation of the Ganzer type in which the hamular processes are fractured and the neurovascular bundles are released from their bony canals in combination with an inferiorly based pharyngeal flap in the management of complicated cases of cleft palate Tomograms and cineradiography with simultaneous sound recording of the normal palates, defective palates, and palates reconstructed by the combined push-back and pharyngeal flap procedures have provided new and effective means of interpretation of palatal function during speech They have demonstrated that the pharyngeal flap is effective in holding the soft tissues of the palate in permanent retrodisplacement while not interfering with the levator action of the mobile soft palate during speech Also, cineradiography with simultaneous sound recording has demonstrated that a rigid soft palate held in permanent retrodisplacement by the pharyngeal flap procedure is effective in the enunciation of acceptable speech even though the fibrosis of the soft tissues prevents the levator function of the palate



FIG 165 Fluoroscopic pictures of the motions of the soft palate following palate lengthening by the push-back procedure combined with the inferiorly based pharyngeal flap These photographs were taken from a cineradiographic film made with image intensification and with simultaneous sound recording (Top) The palate is angulated upward as the palate emits the sound "kay" The pharyngeal flap served the function of holding the soft tissue of the palate in retrodisplacement while not interfering with the mobility of the palate (Bottom) Same patient with the palate at rest

(This is a positive print so that the bone, teeth and soft tissues are dark instead of light, as in a negative)

REFERENCES

1 Sandifort, P J Deglutitionis mechanismus, verticale sectione narium, oris, faucium, 1805

2 Dorrance, G M The operative story of cleft palate Philadelphia and London, W B Saunders Co, 1933, p 367

3 Calnan, J The error of Gustav Passavant Plast & Reconst Surg, 13 275, 1954

4 Passavant, G, Quoted by Dorrance, G M, op cit, p 252

5 Ganel, Quoted by Dorrance, G M, ibid

6 Pickerill, H P On a new method of treating cleft palate New Zealand Med J, 11 125, 1912

7 Fry, W K, and Gillies, H D A new principle in the surgical treatment of congenital cleft palate, and its mechanical counterpart Brit Med J, 1 335, 1921

8 Passavant, G Ueber die Beseitigung der naeselden Sprache bei angeborenen Spalten des harten und weichen Gaumens (Gaumen segel, Schlundnaht und Rueckiagerung des Gaumensegels) Arch f klin. Chir., 6 333 1865
9 Whitehead, W R. Remarks on a case of extensive cleft of the hard and soft palate closed at a single operation. Am J Med. Sci., 62 114 1871
10 Morestin, H Opération complémentaire de l'uranostaphylorraphie, amélioration phonétique considerable obtenue par l allongement de piliers postérieurs. Bull et mém Soc. de chir., 36 621 1910
11 Helbing C Erfahrungen bei 100 Gaumenspaltoperationem mit technischen Mitteilungen Berl. klin Wchnschr., 49 980 1912.
12 Makuen G H., Quoted by Brophy T W Cleft lip and palate. Philadelphia P Blakiston s Son & Co., 1923 p 254.
13 Mirault, G Deux lettres sur l opération du bec-de-lièvre consideré dans ses divers états de simplicité et de complication J de Chir., Par p 257 ii 1844.
14 Kuester E. Ueber die Beseitigung der Functionsstoerungen des weichen Gaumens. Berl. klin Wchnschr., 19 172 1882
15 Blair V P Operative treatment of difficult cases of palate defects after infancy Surg., Gynec & Obst., 12 289 1911
16 Remijnse J G De spraak na de operatieve behandeling van het gespleten verhemelte Nederl Tijdschr v Geneesk, 67 938, 1923
17 Smith H L. Cleft palate Boston Med. & Surg. J 132 478, 1895
18. Goyder F W The anatomy and treatment of cleft palate. Brit. J Surg 16 259 1913
19 Ljvov P Ertweiterung der Operationsmoeglichkeiten bei der Plastik des Gaumens Zentralorgan f d. ges. Chir., 37 617 1927
20 Veau V Division Palatine Paris, Masson et Cie 1931
21 Wardill, W E M Cleft palate Brit. J Surg., 16 127 1928-9
22. Halle Gaumennaht und Gaumenplastik. Ztschr f Hals- Nasen- u Ohrenh., 12 377 1925
23 Blair V P Congenital facial clefts. Surg Gynec & Obst., 37 530 1923
24. Padgett, E. C The repair of cleft palates after unsuccessful operations with special reference to cases with an extensive loss of palatal tissue Arch. Surg., 20 453 1930
25 Limberg A. Neue Wege in der radikalen Uranoplastik bei angeborenen Spaltendeformationen Osteotomia interlaminaris und pterygomaxillaris resectio marginis foraminis palatini und neue Plattchennaht, Fissura ossea occulta und ihre Behandlung. Zentralbl f Chir., 1745 1927
26. Dorrance G M Lengthening the soft palate in cleft palate operations. Ann. Surg., 82 208, 1925
27 Dorrance G M., and Bransfield, J W Cleft palate Ann. Surg., 117 1 1943
28. Brown, J B Double elongations of partially cleft palates and elongation of palates with complete clefts. Surg., Gynec & Obst., 70 815 1940
29 Marino H Rev de Cir., 23 363 1944.
30 Conway H One-stage push-back operation for congenital insufficiency of palate Surgery 22 341 1947
31 Baxter, H., and Cardoso M A method of minimizing contracture following cleft palate operations. Plast. & Reconst. Surg., 12 214, 1947
32 Passavant, G Berichtigung. Arch. f klin. Chir., 6 587 1865
33 Gersuny R. Ueber eine Subcutane Prosthese Ztschr f Heilk 21 199 1900
34 Eckstein H. Ueber Subkutane und Submukoese Hartparaffinprosthesen. Deutsch med. wchnschr., 28 573, 1902.
35 Halloweg, E Beitrag zur Behandlung von Gaumenspalten. Inaug Diss., Tuebingen, 1912
36 Von Gaza, W Ueber freie Fettgewebstransplantation in den retropharyngealen Raum bei Gaumenspalte Arch f klin Chir 142 590 1926
37 Woods R. Aids to palatal insufficiency after cleft palate operations. Brit. Med. J., 1 371 1927
38 Hynes, W Pharyngoplasty by muscle transplantation. Brit. J Plast. Surg., 3 128, 1950
39 Rutenberg, D Ueber Gaumenspaltennaht und Erzielung einer reinen (nicht naeselnden) Sprache durch Vorlagerung der hinteren Schlundwand. Wien med. Wchnschr., 26 815 1876
40 Wardill W E. M Discussion on the treatment of cleft palate by operation. Proc Roy Soc., Med 5 178 1926-7
41 Botey R. Tratamiento quirurgico de la insuficiencia velo-palatina. Rev de. cien. med. de Barcel 33 433, 1907
42 Ernst, F Zur Frage der Gaumenplastik. Centralbl f Chir., 52 464, 1925
43. Kirschner Quoted by Dorrance G M The operative story of cleft palate Philadelphia and London, W B Saunders Co 1933, p 282.
44 Kirkham H L. D., Preliminary paper on improvement of speech in cleft palate cases. Surg Gynec & Obst., 44 244 1927
45 Přecechtěl, A Retrotransposition of the pterygoid process in a short palate, otolaryng. Slavica, 1 145 1929
46 Réthi A. Operative Rachenverengerung, zur Behebung der Rhinolalia aperta. Monatschr f Ohrenh 66 842 1932
47 Passavant, G Ueber d. Verschliessung d. Schlundes beim Sprechen, reviewed by Merkel L Schmidt's Jahrb p 350 1867
48. Schoenborn Ueber eine neue Methode der

Staphyloraphie Verhandl d deutsch. Gesellsch f Chir, 4 235, 1875

49 Schede, Quoted by Predoehl, A Zur operativen Behandlung der Gaumenspalten Jahrb d Hamb Staatskrankenan -Sta, p 174, 1889

50 Rosenthal, W Zur Frage der Gaumenplastik Zentralbl f Chir, 51 1621, 1924

51 Fruend, H Gaumenspaltenoperationem nach Schoenborn-Rosenthal Zentralbl f Chir, 54 3206, 1927

52 Padgett, E C, and Stephenson, K L Plastic and Reconstructive Surgery, Springfield, Illinois, Charles C Thomas, 1948

53 Moran, R E The pharyngeal flap operation as a speech aid Plast & Reconst Surg, 7 202, 1951

54 Dunn, F S Observations on the pharyngeal flap operation for the improvement of speech in cleft palate patients Plast & Reconst Surg, 7 530, 1951

55 Conway, H Combined use of the push-back and pharyngeal flap procedures in the management of complicated cases of cleft palate Plast & Reconst Surg, 7 214, 1951

56 Fogh-Andersen, P Inheritance of harelip and cleft palate Copenhagen, Nyt Nordisk, Forlag-ArnoldBusck, 1942

Lambeau Pharyngien à Base Inférieure pour la Restauration de la Parole dans les Cas Compliqués de Division Palatine. HERBERT CONWAY ET RICHARD B STARK

Ce travail est l'analyse de 517 cas de division palatine dont 81 (16%) n'avaient pas acquis une élocution acceptable par les procédés habituels de suture palatine suivie dans de nombreux cas par l'allongement du palais selon la technique du "push-back" 64 (79% de ces malades) recouvraient une élocution acceptable après l'emploi de l'opération "push-back" combinée avec un lambeau pharyngien à base inférieure L'utilisation de ce lambeau empêche la récidive postopératoire du raccourcissement du palais On arrive à obtenir ainsi un déplacement postérieur permanent des parties molles du palais Le lambeau à base inférieure permet un déplacement d'air adéquat à travers l'orifice buccal avec amélioration des plosives et des sybillantes En outre le lambeau pharyngien divise l'oropharynx en deux petites ouvertures, une sur chaque côté

Les statistiques ici rapportées montrent la valeur de cette intervention combinée ("push-back" et lambeau pharyngé) et la cinéradiographie avec enregistrement simultané de son montre que le palais mou est capable d'élévation adéquate bien qu'il soit arrimé par le lambeau pharyngé

Über unten gestielte Pharyngeallappen bei der Wiederherstellung der Sprechfunktion in komplizierten Fallen von Gaumenspalten. HERBERT CONWAY UND RICHARD B STARK

Die Darstellung betrifft eine Analyse von 517 Fallen von Gaumenspalten, bei denen in 81 Fallen (16%) keine annehmbare Sprache mittels des Routineverfahrens der Gaumennaht, in vielen Fallen gefolgt von Gaumenverlangerung entsprechend der "Push-back" Operation, erzielt wurde In 64 (79%) dieser Falle konnte eine vollkommen annehmbare Sprache nach Anwendung der "Push-back" Operation in Verbindung mit unten gestielten Pharyngeallappen erreicht werden Die Anwendung des Lappens verhindert ein postoperatives Rezidiv der Gaumenverkurzung Eine Dauerruckverlagerung des weichen Gaumengewebes wird erreicht Der unten gestielte Lappen gestattet eine ausreichende Verschiebung des Luftstromes durch die Mundspalte, wodurch eine Verbesserung der Explosivund der Zischlaute erzielt wird Zusatzlich teilt der Pharynxlappen den Mundpharynx in zwei schmale Öffnungen, eine auf jeder Seite Die Statistiken, die veroffentlicht worden sind, bestatigen den Wert des kombinierten Operationsverfahrens ("Push-back-Pharynxlappen) und Film-Rontgenaufnahmen mit gleichzeitigen Tonbandaufnahmen (vorgefuhrt wahrend des Originalvortrages) zeigen, dass der weiche Gaumen, obwohl durch den Pharynxlappen fixiert, einer ausreichenden Hebung fahig ist

Colgajo Faringeo de Base Inferior en la Rehabilitacion Fonetica de Fisuras Palatinas Complicadas. HERBERT CONWAY Y RICHARD B STARK

Se presenta un análisis de 517 casos de fisura palatina en 81 de los cuales (16%) no se produjo buena fonética por el procedimiento de rutina de sutura palatina Por la técnica de retropulsión, 64 casos adquirieron buena fonética por el empleo de la operación de retropulsión conbinada con el colgajo faringeo de base inferior El uso del colgajo previene la recurrencia postoperatoria del acortamiento delpaladar y se consigue buen retro desplazamiento de los tejidos blandos

El colgajo de base inferior permite un paso adecuado de aire a traves de las porciones laterales mejorando las letras explosivas y silbantes Además, el colgajo faringeo divide la faringe en dos pequeñas aberturas laterales, una a cada lado

Las estádisticas que se reportan confirman el valor del procedimiento operatorio combinado (retropulsión y colgajo faringeo) y las cineradiografías de sonido (mostrada en la presentación formal) mostró que el paladar blando es capaz de elevación adecuada aun cuando esté adherido el colgajo faringeo

8 Passavant, G Ueber die Beseitigung der naeselden Sprache bei angeborenen Spalten des harten und weichen Gaumens (Gaumensegel, Schlundnaht und Rueckklagerung des Gaumensegels) Arch. f klin Chir., 6 333 1865
9 Whitehead W R. Remarks on a case of extensive cleft of the hard and soft palate, closed at a single operation Am. J Med Sci. 62 114, 1871
10 Morestin H Opération complémentaire de l uranostaphylorraphie, amélioration phonétique considerable obtenue par l allongement de pilliers postérieurs. Bull. et mém Soc. de chir., 36 621 1910
11 Helbing, C Erfahrungen bei 100 Gaumen spaltoperationem, mit technischen Mitteilungen. Berl. klin. Wchnschr., 49 980 1912
12 Makuen G H., Quoted by Brophy T W Cleft lip and palate Philadelphia P Blakiston's Son & Co 1923 p 254
13 Mirault, G Deux lettres sur l opération du bec-de-lièvre consideré dans ses divers états de simplicité et de complication. J de Chir., Par p 257 u 1844.
14. Kuester E. Ueber die Beseitigung der Functionsstoerungen des weichen Gaumens. Berl klin. Wehnschr., 19 172 1882
15 Blair V P Operative treatment of difficult cases of palate defects after infancy Surg., Gynec. & Obst., 12·289 1911
16 Remijnse J G De spraak na de operatieve behandeling van het gespleten verhemelte Nederl. Tijdschr v Geneesk 67 938 1923
17 Smith H. L Cleft palate Boston Med. & Surg. J., 132 478 1895
18. Goyder F W The anatomy and treatment of cleft palate Brit. J Surg., 19.259 1913
19 Ljvov P Ertweiterung der Operationsmoeglichkeiten bei der Plastik des Gaumens. Zentralorgan f d. ges. Chir., 37 647 1927
20 Veau V Division Palatine, Paris, Masson et Cie, 1931
21 Wardill, W E. M Cleft palate Brit. J Surg 16 127 1928-9
22 Halle Gaumennaht und Gaumenplastik. Ztschr f Hals- Nasen- u Ohrenh 12 377 1925
23 Blair V P Congenital facial clefts. Surg., Gynec. & Obst., 37.530 1923
24. Padgett, E. C The repair of cleft palates after unsuccessful operations with special reference to cases with an extensive loss of palatal tissue. Arch Surg., 20 453 1930
25 Limberg A. Neue Wege in der radikalen Uranoplastik bei angeborenen Spaltendeformationen Osteotomia interlaminaris und pterygomaxillaris, resectio marginis foraminis palatini und neue Plattchennaht, Fissura ossea occulta und Ihre Behandlung. Zentralbl f Chir., 1745 1927
26 Dorrance G M Lengthening the soft palate in cleft palate operations. Ann. Surg., 82 208, 1925
27 Dorrance G M., and Bransfield J W Cleft palate Ann. Surg., 117 1 1913
28. Brown, J B Double elongations of partially cleft palates and elongation of palates with complete clefts. Surg., Gynec. & Obst., 70 815, 1940
29 Marino H Rev de Cir., 23 363 1944
30 Conway H One-stage push-back operation for congenital insufficiency of palate Surgery 22 341 1947
31 Baxter H., and Cardoso M A method of minimizing contracture following cleft palate operations. Plast. & Reconst. Surg 12 214, 1947
32. Passavant, G Berichtigung Arch f. klin. Chir., 6.587 1865
33 Gersuny R. Ueber eine Subcutane Prosthese. Ztschr f Heilk., 21 199 1900
34 Eckstein H Ueber Subkutane und Submukoese Hartparaffinprosthesen Deutsch med. wchnschr., 28 573 1902
35 Halloweg, E Beitrag zur Behandlung von Gaumenspalten. Inaug. Diss., Tuebingen, 1912.
36 Von Gaza, W Ueber freie Fettgewebstransplantation in den retropharyngealen Raum bei Gaumenspalte Arch f klin Chir., 142 590 1926
37 Woods, R. Aids to palatal insufficiency after cleft palate operations Brit. Med J., 1.371 1927
38. Hynes W Pharyngoplasty by muscle transplantation. Brit. J Plast Surg., 3 128, 1950
39 Rutenberg, D Ueber Gaumenspaltennaht und Erzielung einer reinen (nicht naeselnden) Sprache durch Vorlagerung der hinteren Schlundwand. Wien. med Wchnschr 26.815, 1876.
40 Wardill, W E. M Discussion on the treatment of cleft palate by operation Proc. Roy Soc., Med 5 178 1926-7
41 Botey R. Tratamiento quirurgico de la insuficiencia velo-palatina. Rev de cien. med de Barcel., 33 433, 1907
42 Ernst, F Zur Frage der Gaumenplastik. Centralbl. f Chir., 52 464 1925
43. Kirschner Quoted by Dorrance, G M The operative story of cleft palate. Philadelphia and London, W B Saunders, Co 1933 p 282.
44. Kirkham, H. L. D., Preliminary paper on improvement of speech in cleft palate cases. Surg., Gynec & Obst., 44.244 1927
45 Přecechtěl, A. Retrotranspoition of the pterygoid process in a short palate otolaryng. Slavica, 1 145 1929
46 Réthi A Operative Rachenverengerung, zur Bebebung der Rhinolalia aperta. Monatschr f Ohrenh 66 842 1932
47 Passavant, G Ueber d. Verschliessung d. Schlundes beim Sprechen, reviewed by Merkel L Schmidt's Jahrb p 350 1867
48 Schoenborn Ueber eine neue Methode der

selves against the sides of the tube pedicle to get closure

The use of extra-oral tissue in palate closure is far from new Blair[7] in 1912 described the use of neck flaps turned in through the lower buccal sulcus and referred to earlier extra-oral flaps used by Blasius, Thiersch, and Rotter The use of a tube pedicle for this purpose was described by Quick in 1929 in the article referred to above, and five years later A D Davis[8] achieved a successful result in closure of a large congenital cleft by this method

It is believed, however, that a new principle is employed in certain of the cases to be described in that the pedicle has been carried through to a pharyngeal attachment and used as a "spacer" to enable more efficient and tension-free functioning of the soft palate halves which it separates

The present series consists of 21 cases of congenital cleft palate where a tube pedicle has been introduced

Maxillary Osteotomy

This operation has been performed in 7 of the cases The procedure is of great value in that it not only restores the bite and external contour to the normal, but removes the impediment to speech caused by displaced teeth and a narrow arch

From Tables 1 and 2 it will be seen that the cases can be grouped according to the method of pedicle repair suitable to the case,

Table 1 Primary Attachment of Tube Pedicle

To pharynx	8
To anterior border of soft palate (Gillies-Fry) (In 3 of these additional attachment to pharynx)	10
To buccal surface of palate only	2
To hard palate defect (osteotomy)	1
	21

Table 2 Site of Tube Pedicle

Arm	7
Abdomen	14
Approach to Palate	
Through mouth directly	14
Through mouth via lip attachment	5
Through cheek	1
Through nose via lip attachment	1
	21

and also that the operative approach is adapted to individual circumstances

1 In 10 cases the pedicle was used in place of a Gillies-Fry obturator (Figs 166, 167, top) Initial attachment is to the anterior border of the soft palate making sure that the implantation is carried well laterally (Figs 167, center and bottom) The pedicle can be shaped beforehand to assist this by the "Tour Eiffel" delay (Fig 168)

2 In this important group of 8 cases a united velum could only have been obtained with a prohibitive degree of tension The tube pedicle is attached directly to the pharyngeal wall and later to the edges of the anterior cleft The gap between nose and pharynx is now reduced to two small openings which can be closed by the two halves of the soft palate squeezing against the pedicle (Fig 169)

3 In two cases available local tissue was used to provide nasal lining and the pedicle opened out for buccal surfacing In one other case speech function was quite perfect but the bony deformity was sufficiently severe to require maxillary osteotomy, and the pedicle was used to fill the resulting gap in the hard palate

4 If bony underdevelopment is a marked feature of the case it may be decided in consultation with the consultant dental surgeon



Fig 166 United soft palate has been displaced posteriorly by the Gillies-Fry operation, leaving anterior defect normally closed by obturator

Experience of the Tube Pedicle Flap in Cleft Palate. SIR HAROLD GILLIES, C B E. F R C S, AND A J EVANS, F R. C S *Rookesdown House Plastic and Jaw Unit, Basingstoke, England*

This paper is written with the purpose of emphasising certain factors which may bear in fluence on the problem of speech in cleft palate

UNDERDEVELOPMENT

The most important of these is underdevelopment. The agenesis is shown in the lack of muscle in the soft palate as well as in the bone and mucous membrane There is in fact a minute amount of underdevelopment in all cases but expert operative technique produces normal speech in a high percentage Reliable figures are not yet available but it has been stated that even in Victor Veau s clinic 25 per cent of all cases did not speak normally Given that there were exceptional reasons for 5 per cent one may conclude that the remaining 20 per cent were primarily due to a degree of underdevelopment in which even most approved methods could not produce oronasal closure or functional speech. Perhaps today s figures are considerably better

In the article by Balcombe Quick of Mel bourne entitled "The Gillies Tubed Pedicle Flap in Cleft Palate [1] in which he describes the first utilisation of a tube pedicle with which to complete the palate, he states that the soft palate and the pillars of the fauces particularly were underdeveloped in this case

Once it is admitted that there is need for the introduction of new tissue there is little differ ence in principle in filling up a palatal gap in a congenital case than in one due to trauma and it was long recognised when working on jaw injuries in the two World Wars that the maxil lary defect could be successfully closed by tube pedicle surgery

TENSION

The second factor which deserves further study is that of tension in the united soft palate The tense velum in these 20 per cent of cases is unable to take its share in closing off the nasopharynx. To overcome this failure is the Gillies-Fry operation,[2] which by detaching the soft palate from the hard allows the muscles a great deal more latitude of movement and in a func tional position The corollary to this was the Dorrance push-back and skin graft procedure.[3] There is also the Rosenthal [4] type of pharyngeal flap holding the soft palate back and mechanically narrowing the passage to the nose. Finally the Wardill [5] and Hynes [6] pharyngoplasties aim at bringing forward the muscular pharyngeal wall to complete sphincteric action. There is no doubt that these secondary methods have their quota of successes and also their failures.

Indications for the use of the tubed pedicle will be found within this 20 per cent of poor speakers Its use is also most surely indicated in all cases that require an obturator to fill a palatal gap as in the Gillies-Fry operation. Such efficient appliances are difficult to make cause strain on the the few good teeth present and are psychological handicaps

Let us consider again the question of tension and its restraining influence on the flexibility and excursion of the palate movement Tension may be exerted in an antero-posterior or a transverse direction it is inimicable to and indeed resists any effort of the levator to raise the palate Tension is the child of agenesis and the natural offspring of surgery Some soft palates are so short that it is obvious that they are being held forward by their attachment to the hard palate but there are also united palates which have been separated from the hard palate and pushed back into a functional position, but because of the tension from side to side are unable to elevate for closure

One has only to compare the elevation in one of these tight palates with the normal to realise how immobile they can be When they are pal pated the tension in this type is also obvious As a comparison, in the upper eyelid the most minute amount of lateral tension prevents nor mal levator action from raising the lid, which can be tested by placing the tip of the finger on the outer canthus, exerting a slight outward pull and then trying to raise the lid This thought leads to the further indication that such tight tensed palates should be deliberately divided down the middle and the two halves allowed to relax into their corners. From this tactical position they can spring into full levator action If in addition a tubed pedicle is provided stretching from its attachment to the pharynx forwards, functional speech closure is obtained. It is quite fascinating to watch the two halves of the soft palate squeezing them-

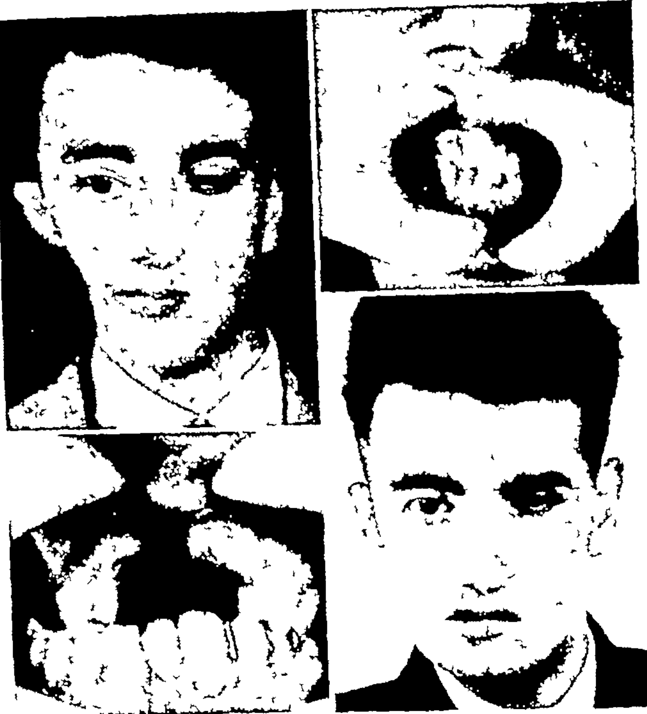


FIG 170 (top) Facial asymmetry with underdevelopment of palate and contracted maxilla (Bottom) Facial contour restored and bite corrected by maxillary osteotomy Palate later restored by tube pedicle



FIG 172 The 'Evans'



FIG 171 (top left) Skull model demonstrating maxillary osteotomy and insertion of bone grafts (Top right) Holiday handle (Bottom left) Kink causing slough (Bottom right) Plaster

that the preliminary procedure of maxillary osteotomy should be performed The two halves of the maxilla are sectioned and displaced into normal relationship with the lower jaw and held there by previously designed splints (Fig 170) Bone chips are inserted to maintain this position (Fig 171, top left)

STAGES IN MANAGEMENT

After the pedicle has been raised and attached to the arm, the patient may be rested by allowing him to go home with both ends attached to the arm, the "Holiday Handle" (Fig 171, top right) There was only a single attachment in this case and a too tight bandage had been applied, kinking the pedicle at its hinge (Fig 171, bottom left) Although the upper arm pedicle requires one less stage the attachment operation is made more difficult when the arm impedes access to the mouth Plaster fixation is used in

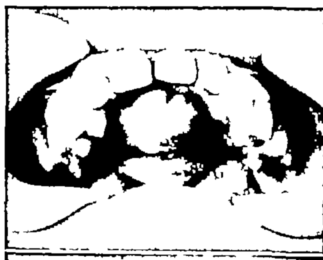






Fig. 167 (top) Anterior defect closed by tube pedicle (Mr J N Barron) (Center) Anterior defect following Gillies-Fry operation (Bottom) Defect closed by tube pedicle



Fig. 168 Bifid end for wide attachment



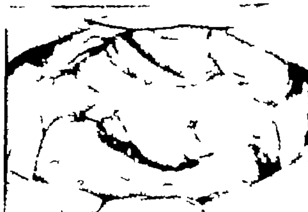


Fig 169 (top) Wide gap in hard and soft palate (Bottom) Cleft closed by tube pedicle attached to pharynx Soft palate halves are seen contracting against pedicle

FIG 176 (top left) Pedicle supported by gutta-percha carried on dental splint which also gags the jaws open (Top right) United soft palate displaced posteriorly leaving large anterior defect (Bottom left) Pedicle attached to anterior border of soft palate and left side of cleft Right side not yet attached (Bottom right) Fistula remaining after closure of extensive cleft by tube pedicle

top right) is particularly helpful when the arm pedicle is used The patient with a small mouth may present a problem (Fig 173, bottom left) This child, aged 2, provided the only failure in the series in that the pedicle broke away on the 7th post-operative day due to the difficulty of achieving a really secure attachment to the pharyngeal wall, aided possibly by an exploring tongue In an adult patient the trismus complication was made worse by some highly-prized bridgework so that the pedicle could not be introduced The way round the difficulty was via the nose and a satisfactory result was thus achieved (Figs 173, bottom right, 174, top left and right and bottom left) Too fat a pedicle may require thinning on subsequent occasions and this may be minimised by the decoring procedure (Fig 174, bottom right) When the pedicle is attached to the pharynx a flap from the posterior pharyngeal wall is designed base downwards, and the pedicle opened out to fit over the raw surface of the pharynx and turned down flap

The placement of sutures may be facilitated by a special boomerang needle such as that designed by Dr Pierre Dumas of Lyons (Fig 175)

Before spreading and further attachment can be carried out it is often an advantage to provide an intra-oral support to take the weight of the pedicle off its new attachment (Fig 176,

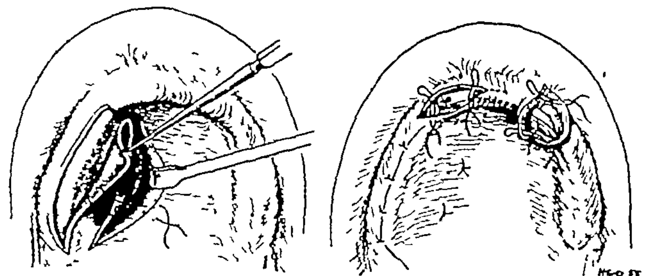


FIG 177 Diagrams illustrating closure of fistula and insertion of bone graft in pedicle tissue to bridge anterior gap in alveolus



Fig. 173 (top left) Lip division for access and (top right) Lip attachment (Bottom left) Child difficulty in access. (Bottom right) Narrow bite preventing introduction of tube pedicle

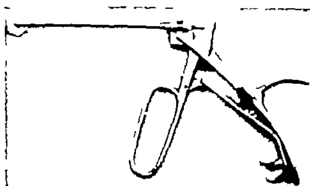


Fig 175 Dr Dumas needle

these cases (Fig 171 bottom right) but may be troublesome post-operatively When the abdominal pedicle is used via the wrist the required post-operative position is most conveniently maintained by this specially designed splint which provides firm support but is also capable of considerable adjustment (Fig 172) Access in the difficult case can be improved by opening a previous lip scar (Fig 173 top left) and an intermediate attachment to the lip (Fig 173,





Fig 174 (top left) Pedicle attached to divided lip and passed through left nostril Nasal septum temporarily displaced to the right. (Top right) Pedicle attached to posterior pharyngeal wall (Bottom left) Oro-nasal closure by contraction of soft palate halves against the pedicle (Bottom right) Pedicle attached intra-orally being thinned by coring out its contained fat.



FIG 181 Case J E

2 Gillies, H D, and Fry, W K Brit Med J, 1 335, 1921
3 Dorrance, G M Ann Surg, 82 208, 1925
4 Rosenthal, W Fortschs, Zahnh, 4 1021, 1928
5 Wardill, W E M Brit J Surg, 16 127, 1928
6 Hynes, W Brit J Plastic Surg, 3 128, 1950
7 Blair, V P Surgery and diseases of the mouth and jaws St Louis 1912
8 Davis, A D Ann Surg, 99 94, 1934

Experiences Acquises dans la Division Palatine avec le Lambeau Tubulé Pediculé. SIR HAROLD GILLIES ET A J EVANS

Très souvent l'hypodéveloppement et la tension sont responsables des mauvais résultats fonctionnels à la suite de méthodes standards des réparations de la division palatine

Il est possible d'obtenir une fermeture nasopharyngienne satisfaisante dans de tels cas par l'introduction de tissu extrabuccal sous la forme de greffes tubulées pédiculées On discute le traitement de 21 cas selon ce principe Dans le premier grand groupe le pédicule a été utilisé pour fermer les pertes de substance palatine antérieure après une opération de Gillies-Fry, ce qui permettait d'éviter ainsi les difficultés souvelées par un obturateur Dans le second groupe le pédicule se trouve entre les deux moitiés du palais mou et est fixé a la paroi pharyngienne postérieure On obtient ultérieurement une fermeture efficace et sans tension par la contraction des deux moitiés du palais mou contre le pédicule On a également pratiqué dans 7 cas une ostéotomie maxillaire pour normaliser l'articulé et le contour externe de la face On discute les détails techniques des procédés opératoires et des temps de traitement et on présente quelques cas avec des figures

Erfahrungen mit Rundstiellappen bei Spaltgaumen. SIR HAROLD GILLIES UND A J EVANS

Unterentwicklung und Spannung sind haufig fur schlechte Ergebnisse nach Gaumenspaltenoperationen nach den Standard-Methoden verantwortlich

top left) This can be carried on the dental splint which prevents biting of the pedicle Completion of the repair is necessarily carried out in stages (Figs 176 top right and bottom left) In this case (Fig 176 bottom right) the small remaining defect was closed by turning in a flap from the inner side of the alveolus which added considerably to the firmness of the new palate At the same time a bone graft was inserted under the pedicle skin anteriorly to bridge the alveolar gap and assist in the provision of a stable upper denture (Figs. 177 178 top)

This case is presented in detail as an example of the principles and technical details already discussed

Mrs J E aged 26

Bilateral cleft lip and palate repaired in infancy Several secondary corrective operations to lip and nose Palatal defect closed by enormous dental appliance which also helped in bringing the upper lip forward (Figs 179 bottom 180 left) The maxillary hypoplasia and alveolar contraction is shown in the dental model (Fig 180 right)



Fig. 178 (top) Fistula closed and alveolar reconstruction completed
Fig 179 (bottom) Case J E.

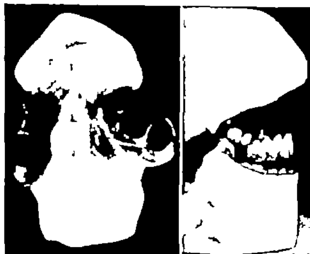


Fig 180 Case J E.

10.10.51 After division of the upper lip osteotomy was performed and the maxillary segments repositioned. Bone chips were inserted and immobilisation carried out by dental splints attached to a plaster headcap (Fig 180 top left) Two months later a tube pedicle from the left upper arm was attached to the pharynx (Fig 181 top right) and the model shows the separated maxillary segments with the cleft closed by the pedicle (Fig 181 bottom right)

She now has complete palate closure, natural facial contour and a normal bite with only a small upper denture (Figs. 181 bottom right, 182 183)

Her speech function is excellent even under the testing conditions of a radio broadcast and she is a thoroughly happy and confident individual no longer tied to an uncomfortable and unpalatable obturator

ACKNOWLEDGEMENTS

The figures quoted in this Article include 3 cases treated by Mr C R. McCash 2 by Mr P Clarkson 1 by Mr W G Holdsworth, and 1 by Mr J N Barron

The photographs are by Mr Ferrill and Mr Burns of the Rooksdown House Photographic Department.

Several are taken from Rowe & Killey (Livingston) and from Principles and Art of Plastic Surgery Gillies & Millard (Little Brown & Co)

The extensive dental collaboration has been readily supplied by N Norman Rowe and his staff

REFERENCES

1 Quick B J of Coll. Surg. Australia, 2.395 1930

the time required for healing of the inserted flap the mouth must be kept open to prevent the biting of the flap and to eliminate this danger protective prosthetic appliances are used If the flap has been taken from the upper arm or from the abdominal or thoracic region as a jump flap via wrist, the head cast and fixing the arm in forced position increases the physical discomfort of the patient

Under these conditions the patient has difficulty of respiration and in swallowing of the saliva, his speech is impeded, feeding troublesome and his physical activity handicapped, all of which have a depressing effect and do not tend to make this procedure attractive Moreover this procedure appears uneconomical due to the great expense of energy in surgeon's work in postoperative care and hospitalization

Having this in view we tried to simplify the method and make it more tolerable for the patient In this attempt we found that a suitable donor area and the para-oral approach enable the introduction of the flap into the mouth without difficulty

A cervicopectoral flap has proved very convenient since it can be obtained long enough for direct transfer into the mouth An acromio-pectoral flap comes into consideration too In utilizing this flap, because of its insufficient length, first its pectoral end should be inserted on the neck and then, in the second stage, the acromial end is sewed into the defect

The method of transferring the flap into the mouth is technically a simple procedure Below the lower border of the mandible an incision through the soft tissue is made so that an opening large enough is obtained to draw the flap through without stretching and compressing it In entering the mouth two routes are used, the one on the buccal side of the mandible via vestibule and the other through the floor of the mouth closure to the lingual side of the mandible For each of these routes there is a specific indication

If the defect of the palate includes the alveolar ridge, then the flap should be introduced via vestibule, while if the defect is in the middle of the palate with existing teeth, then the way through the floor of the mouth is indicated (Fig 184, A and B) Two cases from our series illustrate the operative procedure (Figs 185 and 186)

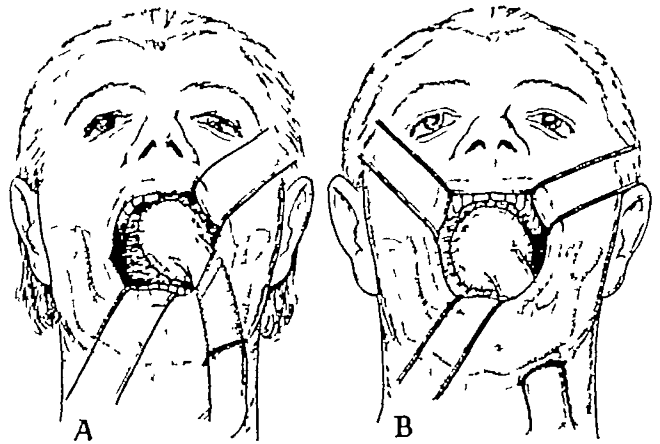


Fig 184 Schematic drawings to illustrate two routes for transferring the pedicle flap into the mouth A Approach from the outside of the mandible via vestibule B Approach through the floor of the mouth close to the lingual side of the mandible

According to our experience the proposed method of treatment is more acceptable for the patient than the one in which the flap is introduced through the open mouth Immediately after this operation the patient is able to close and open his mouth at will Possibly the introduction of the flap through the floor of the mouth may be less comfortable for the patient, but as there is no swelling after the operation, swallowing and moving of the tongue are not accompanied by any difficulties There is no danger of the flap being bitten in two and therefore no protective prosthetic appliances are necessary There are no disturbances in speaking



Fig 185 (left top) Extensive palatal defect following resection of left maxilla for malignancy To close the defect a skin flap has been used (Right) Shows the transferring of the tubed pedicle via vestibule of the mouth (Left bottom) Appearance eight years after operation



FIG. 182 Case J E

Ein befriedigender Naso-Pharynxverschluss kann in diesen Fällen mit der Einbringung von extra oralem Gewebe in Form von Rundstiellappen erzielt werden. Die Behandlung von 21 Fällen wird auf dieser Grundlage besprochen In der ersten Hauptgruppe wurde der Stiel dazu gebraucht, um vordere Gaumendefekte im Gefolge einer Gillies-Fry-Operation zu schliessen um hierdurch die Schwierigkeiten eines Obturators zu vermeiden In der zweiten Gruppe liegt der Stiellappen zwischen den 2 Hälften des weichen Gaumens und wird an die hintere Pharynxwand befestigt Wirksamer und spannungsfreier Verschluss wird dann durch die Kontraktion der beiden Hälften des weichen Gaumens gegen den Stiellappen erreicht In 7 Fällen wurde au zerdem eine Oberkieferosteotomie ausgeführt um den Biss und die au zere Kontur normal zu gestalten. Die technischen Einzelheiten des Operationsverfahrens und der Behandlungsstadien werden besprochen und erläuternde Fälle demonstriert





FIG. 183 Case J E

Experiencia con Colgajo Tubular en el Paladar Fisurado. HAROLD GILLIES Y A J EVANS.

En la reparación del paladar fisurado la tensión y el desarrolo escaso son a menudo responsables de los malos resultados obtenidos desde el punto de vista funcional

La oclusión naso-faringea satisfactoria puede ser obtenida en estos casos por la introducción de tejido extraoral ne forma de tubo pediculado Se discute el tratamiento de 21 casos operados bajo este principio En el primer grupo importante el pedículo fué usado para cerrar el paladar anteriorsegun la operación de Gillies-Fry de este modo se evitaron las dificultades de un obturador En el segundo grupo el pedículo se colocó entre *las dos mitades del paladar blando y fué* suturado a la pared posterior de la faringe

Con este método se obtiene ausencia de tensión por contracción de las dos mitades del paladar blando contra el pedículo

En siete casos la osteotomia maxilar se llevó a cabo con objeto de restaurar la masticación y el contorno exterior Los detalles de técnica del procedimiento operatorio son presentados y discutidos. Se presentan tambien casos ilustrativos.

An Operative Procedure for Transferring the Tube Pedicle Flap into the Mouth.

IVO CUPAR, Dr med, Professor *Department of Stomatology and Maxillofacial Surgery Medical Faculty University of Zagreb, Yugoslavia*

The surgical method of treatment for closure of large palatal defects with extra-oral tissue using the tube pedicle flap has proved its value in traumatic surgery and in selected cases of congenital cleft palate as may be seen in recent reports on this type of the operation

In applying this method we are faced with *some technical problems which are open to discussion*

The tube pedicle flap is usually introduced through the open mouth which is for several reasons uncomfortable for the patient. During

The Reconstruction of Large Defects in the Palate or the Cavity of the Mouth Using a Tubed Flap. P E ASCHAN, M D, *Westend, Helsinki, Finland*

There are two kinds of defects in the oral cavity that call for the use of a tube pedicle flap, namely the large congenital palatal defects and those of traumatic origin, chiefly war-injuries My personal experience is not too wide, consisting of nine cases, four of which are war-injuries

In the cases of congenital palatal defects in adults which I have treated I have used a tube pedicle flap, first of all in order to close the front part of the cleft palate but have tried to use intra-oral material for the reconstruction of the soft palate The remainder of the tube pedicle has been used to close orifices in the front part of the alveolar process or between the nasal cavity and the upper lip, or even to reconstruct the upper lip itself—then usually followed by an Abbé operation In one case the same flap has been employed also for a reconstruction of the eye-lids

It is my experience that there are primarily two factors which are important for achieving a good result The pedicle should preferably not be thicker than an ordinary little-finger or the work within the oral cavity becomes technically too difficult Further the pedicle, which in most cases I have taken from the upper arm, must be allowed to heal into the naso-labial fold before its other end is fitted into the oral cavity The transplantation of the pedicle directly from the arm to the mouth involves a great risk, renders the after-treatment difficult and hampers the taking of drink and food

For the compression and fixation of the unfolded oral end of the pedicle I have used a palate-plate, either made in advance out of celluloid or formed by myself during the operation of a resin-substance

Out of my five cases of congenital palatal defects in adults good results have been achieved in four cases The fifth case was an adolescent boy the treatment of whom, however, may be regarded as unfinished In three of these cases I have split the upper lip or the cheek in order to shorten the distance to the defect



FIG 187 (top row and bottom left) Two typical cases of large congenital defects in the hard palate and alveolar process (Bottom center) A single pedicle flap is being used both for the reconstruction of the eyelids and for the palate (Bottom right) One type of apparatus with a plate at the end of a spring for fixation of the flap

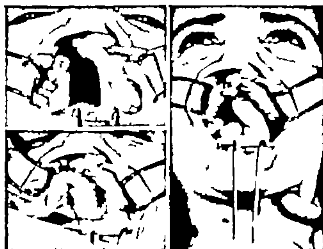


FIG 180 A 28-year-old female patient with cleft lip and palate Not operated previously (Left top) Shows a large diastasis of cleft palate In the first stage the soft palate has been reconstructed by the pharyngoplastic (Right) For closure of the hard palate defect a cervicopectoral pedicle flap has been introduced through the floor of the mouth (Left bottom) Appearance one month after flap has been sewed into the defect Repair of cleft lip is planned as the next stage

and feeding There is no danger of displacement and tension of the pedicle Finally the patient is free to walk about and in the intervals of the successive operative stages may be allowed to leave the hospital.

The only drawback of this method are the remaining scars but the incision scar below the border of the mandible is hardly visible after healing while the scars on the neck are negligible in comparison with the advantages of the procedure.

In using extra-oral tissue for covering large palatal defects in a series of cases we have applied various operative technics but the described method which we have been practising for eight years we have found most satisfactory

SUMMARY

For closure of large palatal defects with extra oral tissue using the tube pedicle flap an operative procedure of introducing the tubed pedicle para-orally i.e. via vestibulo or through the floor of the mouth is proposed. The advantages of this method are pointed out

Un Procédé Operatoire pour le Transfert dans la Bouche d un Lambeau Tubulé Pediculé. IVO CUPAR.

On a décrit un nouveau moyen d'introduire le lambeau tubulé pédiculé dans la bouche à travers le vestibule ou le plancher buccal dans le cas ou on utilise les tissus extrabuccaux pour combler l'importante brèche palatine

On fait remarquer les avantages de cette méthode Pendant le temps nécessaire à la guérison le malade est capable d ouvrir et de fermer la bouche à volonté Il n'y a pas de danger de section par morsure du lambeau et par conséquent il est inutile de faire appel à des appareils protecteurs de prothèse Il est inutile de prendre une mesure quelconque pour empêcher le déplacement ou la tension du pédicule La respiration et la déglutition ne sont pas gênées Pendant qu'il mange et qu'il parle le malade n éprouve pas de difficulté particulière qui méritent d'être mentionnées.

Les cicatrices qui persistent sur le cou et endessous de la mandibule sont négligeables, compte tenu des avantages du procédé

Ein Operatives Verfahren zur Einführung des Rundstiellappens in den Mund. IVO CUPAR.

Bei Verwendung der Rundstielplastik zum Verschluss grosser Gaumendefekte wird ein neues operatives Verfahren der Einführung des Rundstiellappens in den Mund durch den Mundvorhof oder den Mundboden angegeben.

Die Vorteile der Methode werden hervorgehoben Während der Einheilung des Lappens kann der Kranke den Mund frei auf-und zumachen Es besteht keine Gefahr dass der Lappen verdrängt gespannt oder durchgebissen wird und so sind keine prothetischen Maasnahmen notwendig. Atmung und Schlucken sind nicht gestört. Beim Essen und Sprechen hat der Kranke keine nennenswerten Schwierigkeiten

Die am Hals und unter dem Unterkiefer zurück gebliebenen Narben sind bedeutungslos angesichts der erwähnten Vorteile des Verfahrens

Un Procedimiento Operatorio para Trasladar Colgajo Pediculado Tubular Dentro de la Boca. IVO CUPAR.

Ha sido descrito el uso tejido extra oral para cubrir un gran defecto palatino por medio de un nuevo procedimiento operatorio introduciendo un colgajo pediculado dentro de la boca a través del vestíbulo o del piso de la boca.

Son señaladas las ventajas de éste método Durante el tiempo requerido para la curación del paciente es factible abrir y cerrar la boca a voluntad No hay peligro de que el colgajo se lesione y sin embargo no es necesario aplicar ninguna prótesis protectora No se requirió tomar ningún cuidado de desplazamiento o de tensión del pedículo La respiración y la deglución no fueron perturbadas El paciente no presentó ninguna dificultad al hablar ni al comer

Las cicatrices del cuello y de la mandíbula, no tienen importancia en comparación con las ventajas del procedimiento

The Reconstruction of Large Defects in the Palate or the Cavity of the Mouth Using a Tubed Flap. P E Aschan, M D, *Westend, Helsinki, Finland*

There are two kinds of defects in the oral cavity that call for the use of a tube pedicle flap, namely the large congenital palatal defects and those of traumatic origin, chiefly war-injuries My personal experience is not too wide, consisting of nine cases, four of which are war-injuries

In the cases of congenital palatal defects in adults which I have treated I have used a tube pedicle flap, first of all in order to close the front part of the cleft palate but have tried to use intra-oral material for the reconstruction of the soft palate The remainder of the tube pedicle has been used to close orifices in the front part of the alveolar process or between the nasal cavity and the upper lip, or even to reconstruct the upper lip itself—then usually followed by an Abbé operation In one case the same flap has been employed also for a reconstruction of the eye-lids

It is my experience that there are primarily two factors which are important for achieving a good result The pedicle should preferably not be thicker than an ordinary little-finger or the work within the oral cavity becomes technically too difficult Further the pedicle, which in most cases I have taken from the upper arm, must be allowed to heal into the naso-labial fold before its other end is fitted into the oral cavity The transplantation of the pedicle directly from the arm to the mouth involves a great risk, renders the after-treatment difficult and hampers the taking of drink and food

For the compression and fixation of the unfolded oral end of the pedicle I have used a palate-plate, either made in advance out of celluloid or formed by myself during the operation of a resin-substance

Out of my five cases of congenital palatal defects in adults good results have been achieved in four cases The fifth case was an adolescent boy the treatment of whom, however, may be regarded as unfinished In three of these cases I have split the upper lip or the cheek in order to shorten the distance to the defect



Fig 187 (top row and bottom left) Two typical cases of large congenital defects in the hard palate and alveolar process (Bottom center) A single pedicle flap is being used both for the reconstruction of the eyelids and for the palate (Bottom right) One type of apparatus with a plate at the end of a spring for fixation of the flap

In the treatment of traumatic injuries which are of highly varying character with often very large defects a more solid pedicle however may be indicated In these cases therefore the donor area as well as the last extra-oral fixation point vary considerably and a wider opening of the upper lip and cheek is more often necessary

On the basis of my experience so far I have formed the opinion that the transplantation of a tube pedicle flap into the oral cavity is a good method which should be applied to all large defects in which sufficient tissue material can not be procured within the oral cavity itself The method can therefore successfully be applied to large congenital palatal defects especially in adults and is particularly suitable for big defects in the *hard* palate For the reconstruction of the soft palate the use of a mucous flap is indicated

La Réconstruction des Grandes Pertes de Substance du Palai ou de la Cavité Buccale à l Aide d un Lambeau Tubulé Provenant du Bras. P F Aschan

Dans le traitement opératoire de quelques plaies de guerre du maxillaire ou du palais aussi bien que de quelques cas compliqués de pertes de substance palatine l origine congénitale il peut être nécessaire d avoir recours à du tissu extrabuccal pour recouvrir les brèches Dans la plupart des cas un lambeau tubulé habituellement prélevé au bras a été fixé près de la commissure de la bouche et à *partir de ce point inséré dans la cavité buccale* Le lambeau tubulé doit remplir les conditions suivantes il ne doit pas gêner par son épaisseur le travail du chirurgien à l intérieur de la bouche sa fixation extra buccalle doit être calculée façon à éviter le déplacement et la tension il doit être capable de supporter une compression intrabuccale convenable L auteur expose ses méthodes pour résoudre ces différents problèmes

Der Verschluss grosser Defekte im Gaumen oder in der Mundhöhle mit Rundstiellappen vom Oberarm. P E. Aschan

Bei der operativen Behandlung einiger Kriegsverletzungen des Oberkiefers oder des Gaumens ebenso wie in einigen komplizierten Fällen von kongenitalen Gaumendefekten kann es notwendig sein, extraorales Gewebe zur Defektdeckung heranzuziehen In den meisten Fällen wurde ein gestielter Lappen zumeist vom Oberarm nahe am Mundwinkel eingepflanzt und von da aus in den Mund eingeführt Der Rundstiellappen sollte die folgenden Bedingungen erfüllen er darf nicht infolge seiner Dicke die Arbeit des Chirurgen innerhalb des Mundes behindern bei seiner extraoralen Anheftung ist darauf zu achten, dass Verlagerung und Zug vermieden werden geeignete intraorale Kompressionsmethoden müssen anwendbar sein.

Der Verfasser bespricht seine Methoden zur Lösung dieser Probleme

Reconstruccion de Grandes Defectos del Paladar o de la Cavidad Bucal Usando Colgajo Tubulado. P E Aschan

En el tratamiento operatorio de algunas lesiones de guerra del paladar o del maxilar asi como en algunos casos complicados de defectos palatinos congénitos puede necesitarse tejido extra-oral para cubrir los defectos En muchos casos un colgajo tubulado tomado casi siempre del brazo se ha fijado cerca del ángulo de la boca e introducido desde alli adentro de ella El colgajo tubular debe llenar los siguientes requisitos no presentar dificutades al trabajo del cirujano dentro de la boca por su grosor su fijación extraoral debe ser calculada para evitar desplazamiento y tensión, y debe permitir la aplicación de una compresión intraoral apropiada El autor señala sus métodos para resolver estos problema

---

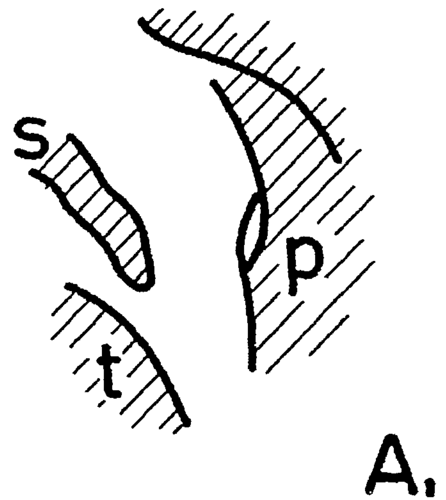
A Preliminary Study by X Ray Movie of Cleft Palate Function Pre- and Post operatively

Bengt Nylén, M D, *Plastil kirurgiska avdelningen, Akademiska sjukhuset Uppsala, Sweden.*

This is a preliminary report of a study started on the function of the soft palate in cases with cleft palate The literature in this field will be dealt with in a later report In collaboration with Drs J Lind and C Wegelius Stockholm, and T Skoog Uppsala we have had the opportunity to make observations on our cleft palate cases with a new X ray movie apparatus made by Philips Company in Holland. The investigator views the field during the filming The film is 35 mm the speed around 45 frames per second. The radiation exposure in one minute is below 10 R. This low exposure is made possible by an image amplifier

We have made 20 films of pre and postoperative cleft palate cases. The time has been too short to make follow-up movies as yet. The age of the patients ranges from 2 weeks to 30 years In children below 5 years of age there have been difficulties in taking the movies above that age it has been much easier At first contrast material had been inserted in the nose on the tongue and the posterior pharyngeal wall Later filming without contrast has been quite satisfactory







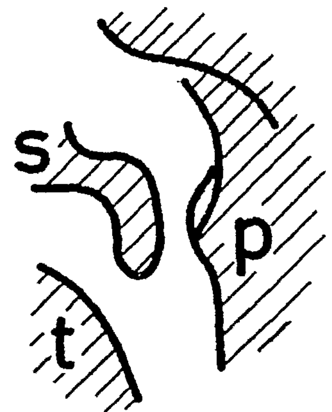


Fig 188 *Case 1* A and A_1—at rest B and B_1—in motion s soft palate p posterior pharyngeal wall t base of the tongue

As a rule sideviews have been taken In order to visualize the nasopharyngeal closure axial exposures have also been employed To illustrate the method the following 3 cases are presented

Case 1 Woman, E L, 39 years of age, with a complete cleft palate She has used an obturator and the cleft has never been operated on Her speech is hardly understandable without the obturator, somewhat improved with it Note the position of the soft palate when intonating and also the movement of the posterior pharyngeal wall (constrictor muscle) (Fig 188)

Case 2 Boy, T G, 6 years of age, with a complete cleft palate The palate was operated on at the age of two years with a closure according to Veau-Wardill by Dr T Skoog The palate is now well healed and moves freely when intonating The speech is normal The sideview shows a complete nasopharyngeal closure with a good contact between the uvula and the posterior pharyngeal wall (Fig 189)

Case 3 Boy, A H, 18 years of age, with a complete cleft palate He was operated on at the age of 6 months and 3 years according to

In the treatment of traumatic injuries which are of highly varying character with often very large defects a more solid pedicle however may be indicated In these cases, therefore the donor area as well as the last extra-oral fixation point vary considerably and a wider opening of the upper lip and cheek is more often necessary

On the basis of my experience so far I have formed the opinion that the transplantation of a tube pedicle flap into the oral cavity is a good method which should be applied to all large defects in which sufficient tissue material can not be procured within the oral cavity itself The method can therefore successfully be applied to large congenital palatal defects especially in adults and is particularly suitable for big defects in the *hard* palate For the reconstruction of the soft palate the use of a mucous flap is indicated.

La Réconstruction des Grandes Pertes de Substance du Palai ou de la Cavite Buccale à l Aide d un Lambeau Tubulé Provenant du Bras. P E. Aschan

Dans le traitement opératoire de quelques plaies de guerre du maxillaire ou du palais aussi bien que de quelques cas compliqués de pertes de substance palatine l origine congénitale il peut être nécessaire d avoir recours a du tissu extrabuccal pour recouvrir les brêches Dans la plupart des cas un lambeau tubulé habituellement prélevé au bras a été fixé près de la commissure de la bouche et à partir de ce point inséré dans la cavité buccale Le lambeau tubulé doit remplir les conditions suivantes il ne doit pas gêner par son épaisseur le travail du chirurgien à l'intérieur de la bouche sa fixation extra buccalle doit être calculée façon à éviter le déplacement et la tension il doit être capable de supporter une compression intrabuccale convenable. L auteur expose ses méthodes pour résoudre ces différents problèmes

Der Verschluss grosser Defekte im Gaumen oder in der Mundhöhle mit Rundstiellappen vom Oberarm. P E. Aschan

Bei der operativen Behandlung einiger Kriegsverletzungen des Oberkiefers oder des Gaumens ebenso wie in einigen komplizierten Fällen von kongenitalen Gaumendefekten kann es notwendig sein, extraorales Gewebe zur Defektdeckung heranzuziehen In den meisten Fällen wurde ein gestielter Lappen, zumeist vom Oberarm nahe am Mundwinkel eingepflanzt und von da aus in den Mund eingeführt Der Rundstiellappen sollte die folgenden Bedingungen erfüllen er darf nicht infolge seiner Dicke die Arbeit des Chirurgen innerhalb des Mundes behindern bei seiner extraoralen Anheftung ist darauf zu achten dass Verlagerung und Zug vermieden werden geeignete intraorale Kompressionsmethoden müssen anwendbar sein

Der Verfasser bespricht seine Methoden zur Lösung dieser Probleme

Reconstrucción de Grandes Defectos del Paladar o de la Cavidad Bucal Usando Colgajo Tubulado. P E Aschan

En el tratamiento operatorio de algunas lesiones de guerra del paladar o del maxilar así como en algunos casos complicados de defectos palatinos congénitos puede necesitarse tejido extra-oral para cubrir los defectos En muchos casos un colgajo tubulado tomado casi siempre del brazo se ha fijado cerca del ángulo de la boca e introducido desde allí adentro de ella El colgajo tubular debe llenar los siguientes requisitos no presentar dificultades al trabajo del cirujano dentro de la boca por su grosor su fijación extraoral debe ser calculada para evitar desplazamiento y tensión, y debe permitir la aplicación de una compresión intraoral apropiada El autor señala sus métodos para resolver estos problema

---

A Preliminary Study by X Ray Movie of Cleft Palate Function Pre- and Post operatively

Bengt Nylén, M D, *Plastikkirurgiska avdelningen, Akademiska sjukhuset Uppsala Sweden*

This is a preliminary report of a study started on the function of the soft palate in cases with cleft palate The literature in this field will be dealt with in a later report. In collaboration with Drs J Lind and C Wegelius Stockholm and T Skoog Uppsala we have had the opportunity to make observations on our cleft palate cases with a new X ray movie apparatus made by Philips Company in Holland The investigator views the field during the filming The film is 35 mm the speed around 45 frames per second The radiation exposure in one minute is below 10 R. This low exposure is made possible by an image amplifier

We have made 20 films of pre and postoperative cleft palate cases. The time has been too short to make follow up movies as yet. The age of the patients ranges from 2 weeks to 30 years In children below 5 years of age there have been difficulties in taking the movies above that age it has been much easier At first contrast material had been inserted in the nose on the tongue and the posterior pharyngeal wall Later filming without contrast has been quite satisfactory

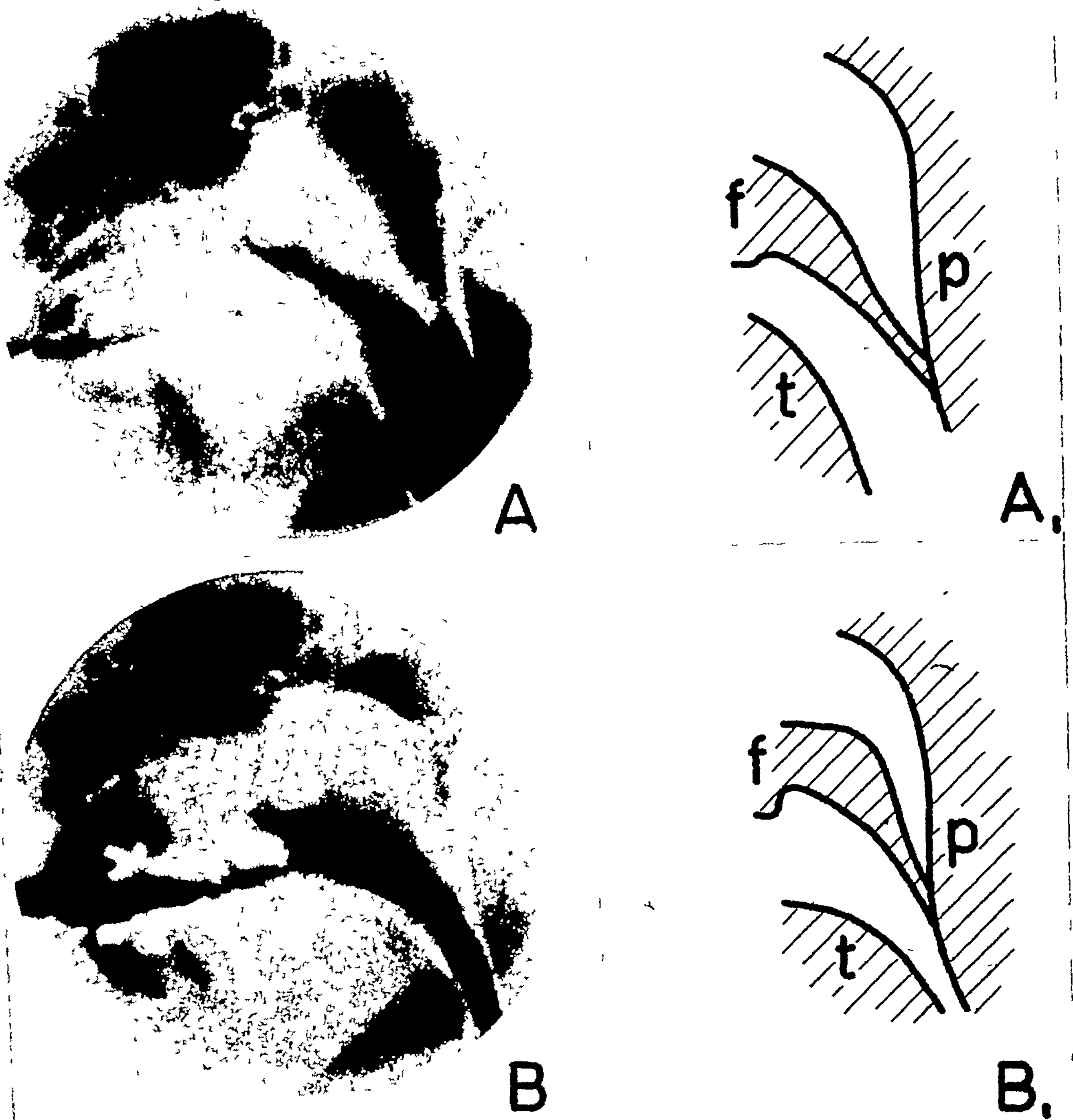


FIG 190 *Case 3* A and A_1—at rest B and B_1—in motion p posterior pharyngeal wall t base of the tongue f pharyngeal flap

après l'intervention Le film utilisé est un film de 35 mm et la vitesse de 45 images/seconde L'irradiation pour une minute est inférieure est inférieure à 10 R Cela est possible grâce à un amplificateur d'image 20 films ont été ainsi tournés Le malade le plus jeune avait 2 mois et le plus âgé 39 ans L'expérience acquise prouve que cette méthode permet la visualisation des mouvements du palais mou et de la paroi pharyngienne postérieure

Eine vorlaufige Untersuchung der Funktion bei Gaumenspalten vor und nach der Operation mit Rontgenkinematographie. BENGT NYLÉN

Wir haben begonnen, Gaumenspaltenfalle vor und nach der Operation mit einer neuen Rontgenapparatur zu filmen Die Filmbreite betragt 35 mm, die Geschwindigkeit etwa 45 Bilder pro Sekunde Die Bestrahlungsdosis in einer Minute liegt unterhalb 10 r Dieses wird durch eine Bild-

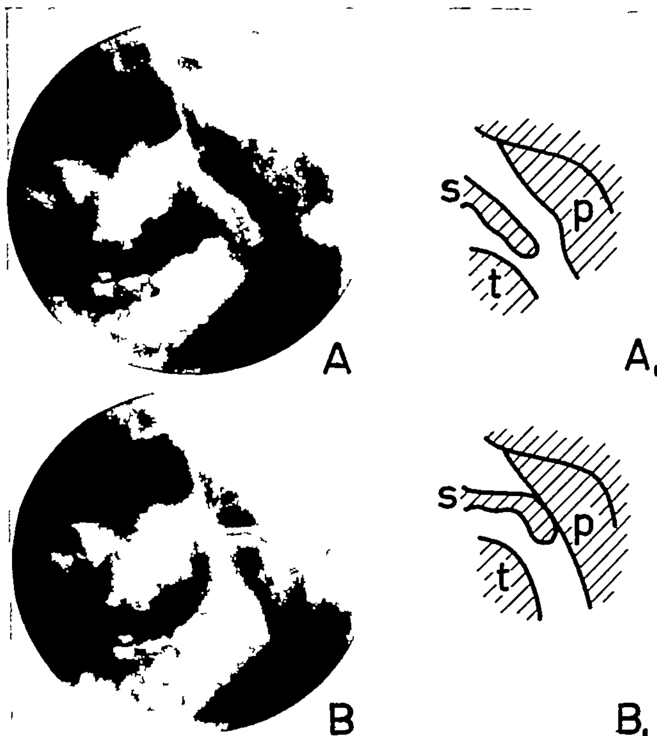


FIG 189 *Case 2* A and A_1—at rest B and B_1—in motion s soft palate p posterior pharyngeal wall t base of the tongue

Veau. Due to a short soft palate and poor speech he was operated on at the age of 17 years by Dr T Skoog This time a pharyngeal flap according to Rosenthal was made The flap healed in well and the speech was improved considerably and is now normal. The movie was taken 9 months postoperatively The motion of the pharyngeal flap is well shown in the picture (Fig 190)

Une Etude Préliminaire Radio-Cinematographique de la Fonction de la Division Palatine Avant et Après Intervention BENGT NYLÉN

Un nouvel appareil à rayons X a permis à l'auteur de filmer les divisions palatines avant et

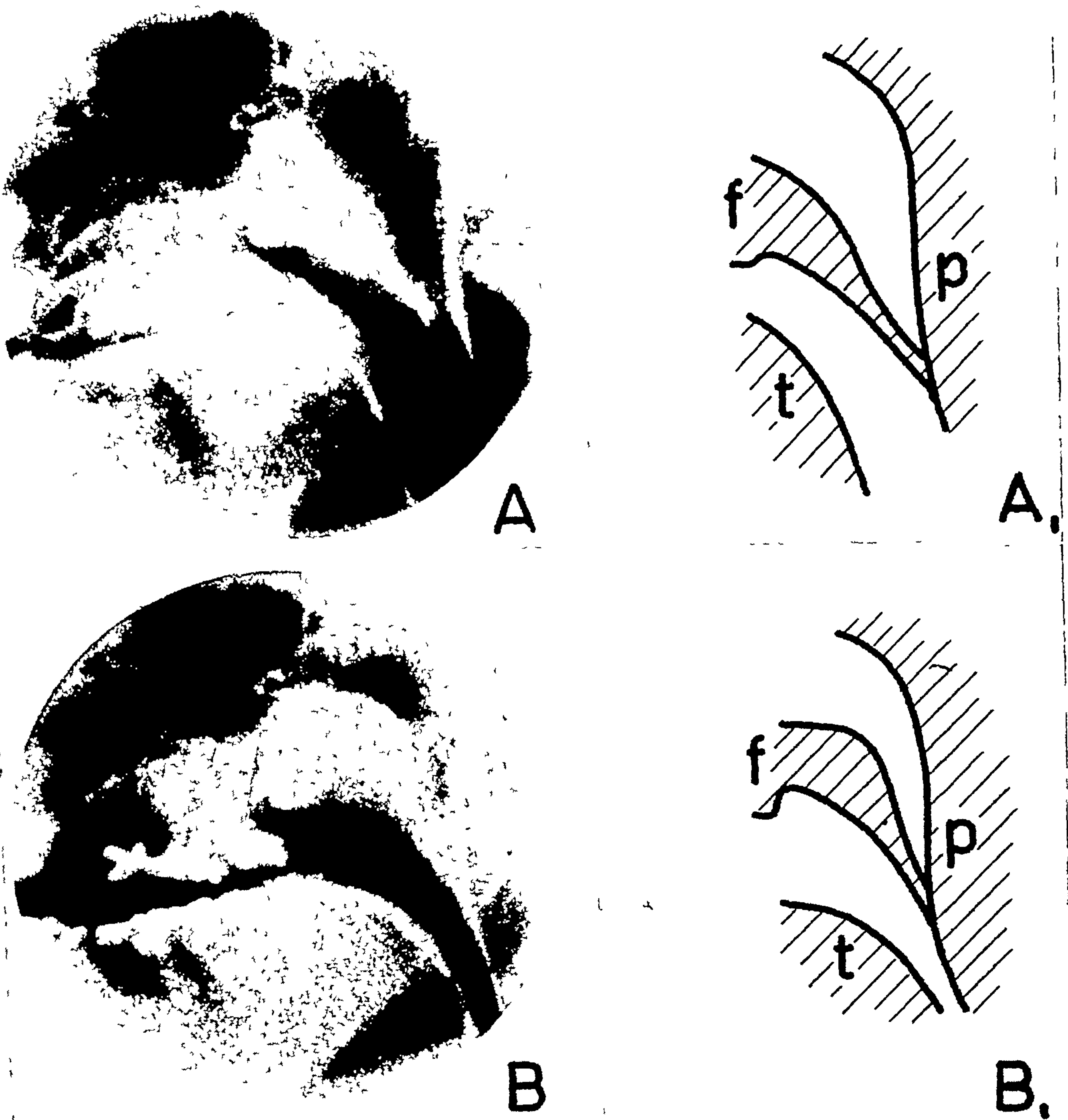


FIG 190 *Case 3* A and A_1—at rest B and B_1—in motion p posterior pharyngeal wall t base of the tongue f pharyngeal flap

après l'intervention Le film utilisé est un film de 35 mm et la vitesse de 45 images/seconde L'irradiation pour une minute est inférieure est inférieure à 10 R Cela est possible grâce à un amplificateur d'image 20 films ont été ainsi tournés Le malade le plus jeune avait 2 mois et le plus âgé 39 ans L'expérience acquise prouve que cette méthode permet la visualisation des mouvements du palais mou et de la paroi pharyngienne postérieure

Eine vorlaufige Untersuchung der Funktion bei Gaumenspalten vor und nach der Operation mit Rontgenkinematographie. BENGT NYLÉN

Wir haben begonnen, Gaumenspaltenfalle vor und nach der Operation mit einer neuen Rontgenapparatur zu filmen Die Filmbreite betragt 35 mm, die Geschwindigkeit etwa 45 Bilder pro Sekunde Die Bestrahlungsdosis in einer Minute liegt unterhalb 10 r Dieses wird durch eine Bild-

verstärkerröhre ermoglicht 20 Filme wurden hergestellt. *Der jüngste Patient war zwei Wochen alt der alteste 30 Jahre* Die gewonnenen Erfahrungen beweisen dass die Bewegung des weichen Gaumens und der hinteren Rachenwand mit dieser Methode klar zur Darstellung gebracht wird

Estudio Preliminar de Cinematografia Roentguen de la Funcion pre y Post-Operatoria de la Fisura Palatina. BENOT NYLÉN

Con un nuevo aparato de rayos X hemos iniciado la filmación de casos de fisura palatina pre y post-operatoria Película 35 mm d velocidad 45 cuadros pro segundo exposición 1 minuto por abajo de dies R lo cual es posible por un amplificador de imagenes.

Viente películas han sido hechas El paciente más joven de 2 semanas el más viejo de 39

Es evidente de la experiencia obtenida que los movimientos del paladar blando y de la pared faringea posterior pueden visualizarse claramente por ésto método

---

On the Disturbances of Growth of the Upper Jaw in Operated Cleft Lips and Palates.

FR. BURIAN, M D, Professor *Department for Plastic Surgery of the Medical Faculty, Charles University, Prague Czechoslovakia*

In recent years attention has been paid to the fate of patients operated on for cleft-lip and palate on reaching adult life A surprisingly great number of deformations of the upper jaw and teeth have been encountered American authors have studied the question most thoroughly and have contributed to the general trend towards prevention of such deformities[1,2]

The University Clinic for Plastic Surgery in Prague has been working on the pathology and therapy of clefts for more than thirty years More than three thousand patients have been treated. Extensive observations on the development of these patients have been made There is a tendency to ascribe all of the disappointing sequelae to surgical technique such as the operation was too early it damages important growth centres and provokes scarring which hampers the expansion of the upper jaw

Some of these accusations may be true some certainly are not.

Most endangered as to late deformations are complete unilateral and bilateral clefts Here most of the hindrance to further development of the maxilla and the alveolar arch originates in the operation on the lip especially if this operation is carried out early when the alveolar process is not firm enough to resist the pressure of the reconstructed lip muscle.

There is no doubt that poor operative methods as well as coarse handling of tissues are capable of producing unfavorable sequelae particularly when performed on very young children. Every surgeon has had reason to deplore such disappointing sequelae of his own initial operations Every specialist in cleft-surgery has also seen many patients branded with the marks of bad surgery where also there were no signs of deformation of the maxilla

It is evident that the characteristic deformation of the maxilla may have other origins.

The main cause lies in the embryonic pathogenesis of clefts Clefts are not a simple non-*coalescence of certain facial processes* of non-penetration of epithelial walls by mesoderm. Victor Veau himself professed that all parts concerned in the cleft are absolutely normal in composition and form the only thing required of the surgeon being to unite the corresponding parts—the rest following automatically

Unfortunately the matter is more complicated. Because the premaxilla is separated from the anterior pole of the upper maxilla by a gap the maxillary process of the premaxilla is unable to reach the pole and to supply its mass in a normal fashion This is quite evident from the skeleton of the maxilla the border of the piriform aperture on the cleft side is deeper than that on the normal side and the pole of the maxilla is smaller (Fig 191)

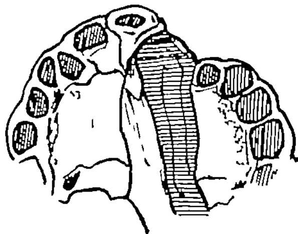


FIG 191 Schematic drawing of total cleft illustrating the most frequently occurring defects and changes on both poles of the cleft.

The premaxilla is also not of normal size Victor Veau described precisely the characteristics of these changes Instead of the maxillary process, the vomerian process hypertrophies and pushes the premaxilla forward There is always a deficiency of the border (Fig 191) The least defect that may be found here is an incomplete alveolus of the second incisor, but, in some cases a half or three quarters of the premaxilla is lacking (Fig 192, top) With two of our patients the premaxilla was completely absent

We might assume that the etiological process has affected even the growing capacity of the parts concerned The bony plates of the cleft palate scarcely enlarge during life, they never unite Analogies exist with other congenital deformities e g the aplasias of hands and fingers in which the growth of the forearm, and frequently of the whole arm is impeded



FIG 192 (top left) A severe case with three quarters of the maxilla missing (Top right) Another severe case where much of the premaxilla is missing (Bottom) Severe case with aplasia of the maxilla existing before operation in a child of 8 months

The characteristic of clefts is that the upper jaw is primarily aplastic, and its further growth is reduced (Fig 192, bottom)

Both of these faults are present to very different degrees in different individuals With total unilateral clefts, where a bridge of soft tissue connects both poles of the cleft, the late deformations are much less pronounced than in cases without such a bridge This bridge signifies that the original developmental defect was not complete so that the impairment to growth is less marked

Finally, many normal individuals develop a certain degree of micrognathia, having smaller, deformed second incisors, which may be even completely missing Novak (Institute of Genetics, Charles University, Prague), investigated a group of school children 11-15 years of age In boys the second upper incisors had not developed in 0 96 per cent, in girls, 1 75 per cent Heredity of such anomalies was frequently recorded There seems to be a tendency in the human race to develop a hypoplasia of the upper jaw

It is evident that children afflicted with plasia, and those descending from afflicted families, are more liable to develop secondary deformations than others The unfavourable influences of the operation are most likely to be manifest with such patients Here it is advisable to postpone the operation of the lip to the fourth month, or even later

As in all complete cleft-lips and palates, the total bulk of the components of the upper jaw and the alveolar arch is smaller than the arch of the mandible, it is not advisable to bring the poles of the cleft together In all operated cases where the poles did not come into contact, there was little or no micrognathia, and the dental occlusion was normal except for the breach at the actual cleft

It is difficult to say how the new methods of lip operation may damage the growing layers of the maxilla Every possible care is devoted to prevent such injury The soft parts are lifted extraperiostally from the anterior face of the maxilla The possibility arises that the blood supply to the growing layers of the bone may be damaged It is not likely that the reconstituted lip muscle will be able to overcompensate the action of the tongue on the alveolar arch Dense scarring could bring this about, but it

verstarkerrohre ermöglicht. 20 Filme wurden hergestellt. Der jüngste Patient war zwei Wochen alt, der älteste 30 Jahre Die gewonnenen Erfahrungen beweisen da s die Bewegung des weichen Gaumens und der hinteren Rachenwand mit dieser Methode klar zur Darstellung gebracht wird.

Estudio Preliminar de Cinematografia Roentguen de la Funcion pre y Post-Operatoria de la Fisura Palatina BENGT NYLEN

Con un nuevo aparato de rayos X hemos iniciado la filmación de casos de fisura palatina pre y post-operatoria Pelicula 35 mm d velocidad 45 cuadros pro segundo exposición 1 minuto por abajo de diez R lo cual es posible por un amplificador de imágenes.

Viente peliculas han sido hechas El paciente mas joven de 2 semanas el mas viejo de 30

Es evidente de la experiencia obtenida que los movimientos del paladar blando y de la pared faringea posterior pueden visualizarse claramente por éste método

---

On the Disturbances of Growth of the Upper Jaw in Operated Cleft Lips and Palates.

FR. BURIAN, M D, Professor Department for Plastic Surgery of the Medical Faculty, Charles University, Prague Czechoslovakia

In recent years attention has been paid to the fate of patients operated on for cleft-lip and palate on reaching adult life A surprisingly great number of deformations of the upper jaw and teeth have been encountered American authors have studied the question most thoroughly and have contributed to the general trend towards prevention of such deformities [1, 2]

The University Clinic for Plastic Surgery in Prague has been working on the pathology and therapy of clefts for more than thirty years More than three thousand patients have been treated Extensive observations on the development of these patients have been made There is a tendency to ascribe all of the disappointing sequelae to surgical technique such as the *operation was too early it damages important growth centres and provokes scarring which hampers the expansion of the upper jaw*

Some of these accusations may be true some certainly are not.

Most endangered as to late deformations are complete unilateral and bilateral clefts Here most of the hindrance to further development of the maxilla and the alveolar arch originates in the operation on the lip especially if this operation is carried out early when the alveolar process is not firm enough to resist the pressure of the reconstructed lip muscle.

There is no doubt that poor operative methods as well as coarse handling of tissues are capable of producing unfavorable sequelae particularly when performed on very young children. Every surgeon has had reason to deplore such disappointing sequelae of his own initial operations Every specialist in cleft-surgery has also seen many patients branded with the marks of bad surgery where also there were no signs of deformation of the maxilla

It is evident that the characteristic deformation of the maxilla may have other origins.

The main cause lies in the embryonic pathogenesis of clefts Clefts are not a simple noncoalescence of certain facial processes of nonpenetration of epithelial walls by mesoderm. Victor Veau himself professed that all parts concerned in the cleft are absolutely normal in composition and form the only thing required of the surgeon being to unite the corresponding parts—the rest following automatically

Unfortunately the matter is more complicated. Because the premaxilla is separated from the anterior pole of the upper maxilla by a gap the maxillary process of the premaxilla is unable to reach the pole and to supply its mass in a normal fashion This is quite evident from the skeleton of the maxilla the border of the piriform aperture on the cleft side is deeper than that on the normal side and the pole of the maxilla is smaller (Fig 191)

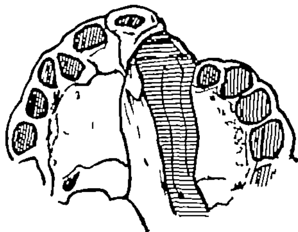


FIG. 191 Schematic drawing of total cleft illustrating the most frequently occurring defects and changes on both poles of the cleft.

bell (Fig 193, center) After this operation we have the children under the control of the orthodontist until time for the operation of the palate His task is to check any deformation that might be expected

When the child starts to form articulate sounds we call in the speech therapist He is put in charge of instructing the mother how to teach the baby articulation, and how to massage the palatal muscles and supervise the treatment For this purpose a nursery school has been established in Prague, admitting a limited number of children There the child acquires the right articulation which, after operation, facilitates the formation of correct speech There are even many cases in which no further speech training is necessary In hospital the training is continued by a speech therapist during the pre- and post-operative period

We have found that the fifth year is convenient for operation on the palatal part of severe unilateral and bilateral clefts At that age the danger of operative damage to the growth centres, as well as the danger that traction of the resulting scar might impede the growth of the maxilla, is reduced In the opinion of psychiatrists it is to be expected that any psychic trauma, which the child has already suffered in consequence of its defect will be soon forgotten and will not leave any sequelae This late time of operation can be risked with clear conscience for new methods ensure a fairly good result even with adults

In our department retroposition of the palate is combined with pharyngofixation The pedicle of the pharyngeal flap is generally situated in the cranial part of the naso-pharyngeal cavity It has the function of retaining the retroposed palate in its new position (Fig 193, bottom) When the soft palate is aplastic, it is preferable to make a flap with a pedicle situated caudally, for it supplies substance for the palate as well as mobility since it contains innervated muscle with blood supply intact Without exception patients are under the care of the speech therapist after operation whether or not they require speech training

Thus, the treatment of severe unilateral and bilateral clefts has become very complex and of long duration because the aim of the treatment is not only correct speech, but also correct appearance and correct dental occlusion. The whole personality has to be improved

To enable an objective comparison of the different methods of treatment, it would be necessary to establish uniform criteria as to the type of the defect and as to the results, both in form and in function An international investigation council, for example under the auspices of UNESCO, could be entrusted with the task Such a council could elaborate a detailed program of investigation as well as research into the etiology, pathology and therapy There should be investigated (1) how frequently the defect occurs in each country, (2) the heredity and attributes, (3) the influence of ecological, social and economic environment, (4) the influence of illnesses and infections

From such evidence the prospective parents could be advised The final aim of this work is prevention

The council could elaborate uniform criteria for the details of the anatomical and physiological pathology of the individual cases and objective criteria for the results obtained by different methods of treatment as to both aesthetics and function so as to make possible comparison of effectiveness of treatment between patients speaking different languages

SUMMARY

Different causes of late deformities in cases of severe cleft-lip and palate were considered Promising methods for prevention of the deformations were discussed A suggestion for international research into the whole question has been presented

REFERENCES

1 Slaughter, W B, and Brodie, A G Plast Rec Surg, 4, July 1949
2 Waldron, C W Plast Rec Surg, 4, July 1949
3 Burian F Časopis lék čes, 1933, No 72
4 Burian F Thomayerova sbírka 300, 2, 1952

Les Troubles de la Croissance du Maxillaire Supérieur Chez les Sujets Opérés pour Bec de Lièvre et Division Palatine. FRANCIS BURIAN

Le bec de lièvre et la division palatine se trouvent associés à des troubles réels aux deux pôles Le potentiel de croissance des segments intéressés se trouve réduit Un certain degré de micrognathie est fréquent chez l'homme et est souvent d'origine

can be avoided by working very carefully and by resuturing the lip mucosa exactly to the gingiva.

As to the operation on the palate, great damage may be caused by operating too early Germinal teeth can be destroyed, which inevitably disturbs further development of the maxilla This is not a rare event with the Veau plastic of the front part of the cleft palate when operating on the lip Scar tissue contraction after operations on the palate may check the expansion of the maxillary arch when operating on young children before they reach the fifth year

To prevent late deformations as far as possible we have to eliminate the factors of our own making and to diminish the effect of those which are rooted in the individual, inaccessible to our direct control

Severe cases of cleft-lip ought to be operated on later than lesser ones the more so if greater deficiencies are present. The earliest date ought to be the fourth month of life It is not necessary to postpone the operation until the end of the first year or later With some of our cases that came to operation in adolescence or even when adult an atrophy of the lip muscle developed which proved very disturbing. With bilateral clefts it is not advisable to postpone the operation too long—the vomer when ossified, would prevent retroposition of the premaxilla.

With severe cases of complete cleft it is not advisable to bring the poles of the cleft together On the contrary prevention of contact seems to be indicated. In 1933 I started to put a flap of lip mucosa between the poles of the cleft as a covering for the oral aspect of the reconstructed floor of the nostril (Fig 193 top) It was designed at that time as a method of preventing perforations in the anterior part of palate which were of frequent occurrence in the Veau operation. I dropped this interposition-operation after discussion with Veau who considered the gap in the alveolar process as an imperfection much worse than a naso-buccal communication. Later on when observing the operated patients I was impressed that in those operated on by the interposition method, there was much less deformation than in those operated on without interposition, except for the premolar segment of the jaw Here we frequently found a transverse constriction, probably as a result of scar



FIG. 193 (top) Sketch of the first method of interposed flap (Center) Presently applied method of interposition. (Bottom) Scheme of the palatal operation showing the fixation of the retroposed palate by a pharyngeal flap with an upper pedicle

ring in the foremost part of the palate where a defect resulted after shifting the Veau palatinal flap

Having acquired this experience, I resumed a modified interposition method with severe total clefts. To reduce the damage to the bone and the effect of scarring as much as possible, I omitted the formation of the palatinal flap and inserted the vomerian flap as advised by Camp-

process clefts are closed by bone grafts (Fig 194, D)

Eight cases have been treated so far Four patients were aged 11 or 12 and had bilateral clefts with highly movable praemaxillae Of the four unilateral cases one patient was aged 14 and the others between 20 and 27 All of them had undergone Veau's operation on the lip and anterior palate at the age of about 2 months, and Ernst Axhausen's operation on the posterior palate at about 2 years There were two bilateral and one unilateral cases with lip operations by Abbé's method

Each of these patients had the typical secondary jaw deformity more or less pronounced (Fig 195)

Following orthodontic correction (Fig 196), bone blocks from the iliac crest were grafted to the defects in the alveolar process A fixation arch of 1 1 mm stainless spring wire, running along the labial surface of the maxillary dental arch between the two six-year molars (Fig 197) was fitted immediately after the operation It was attached by bands round the requisite number of teeth

To facilitate evaluation of the results we are making repeated follow-ups by means of

1 Plaster models of both jaws

2 Cephalometric X-ray pictures of the entire cranium, and separate X-ray pictures of the cleft regions These latter radiograms are taken with the aid of a specially designed device (Fig 198) that ensures identical stereoprojections at different times

In the bilateral cases the mobility of the praemaxilla was recorded by means of Muhlemann's periodontometer (Fig 199)

Results In six cases the mucosal flaps healed without defects, in two cases—one bilateral and one unilateral—defects arose, but they seem to be on the way to filling out with granulation tissue The block bone grafts have healed in nicely in each case After about two months we observed that the structure of the block bone

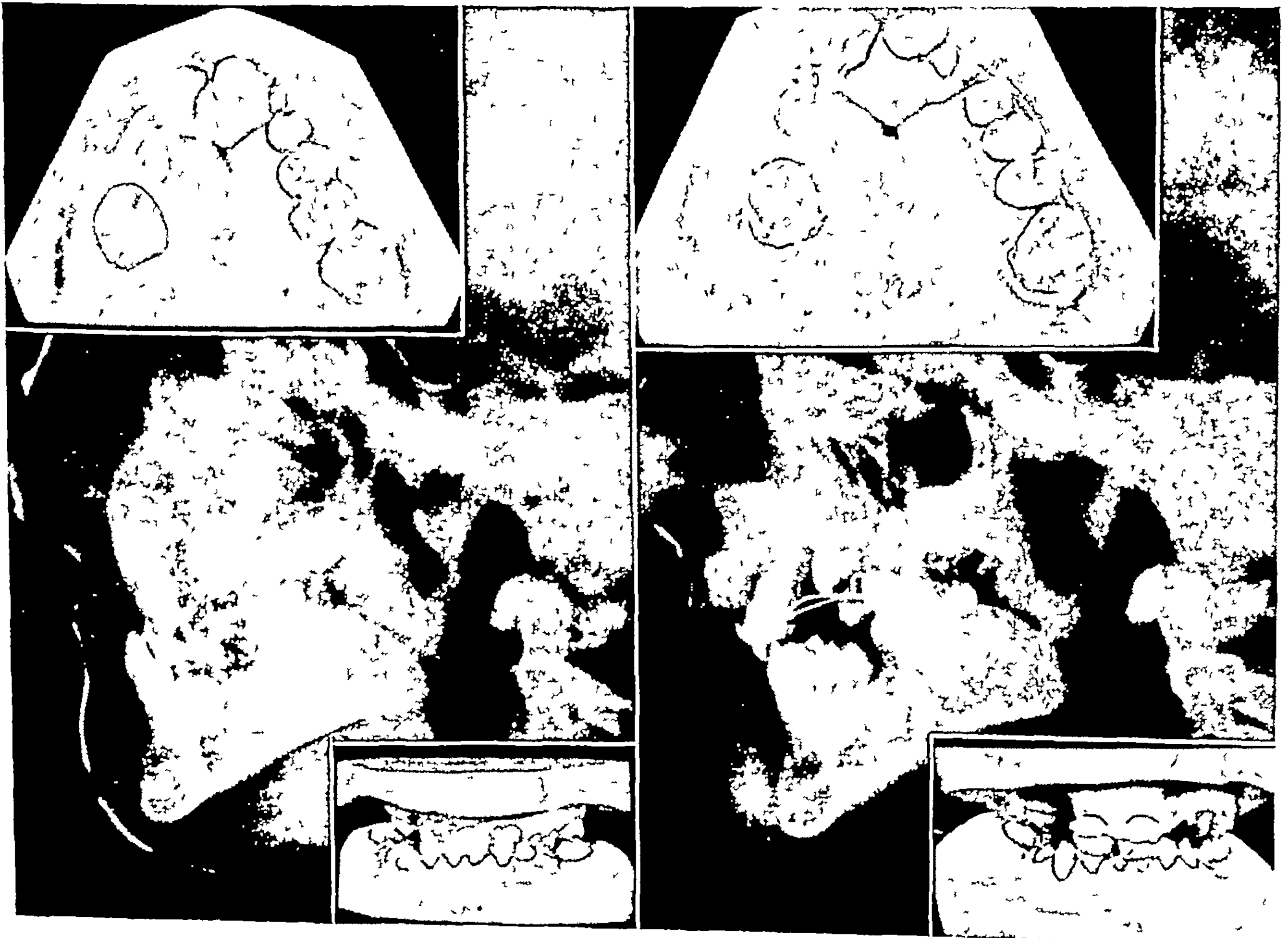


Fig 195 (left) Typical secondary jaw deformity following bilateral cleft palate
Fig 196 (right) The case shown in fig 195 following orthodontic correction

héréditaire Quand quelques-unes ou la totalité de ces différentes conditions individuelles existent des déformations tardives graves même en l'absence de traumatisme chirurgical. Le rapprochement des pôles du maxillaire entrainera une déformation.

L'auteur opère les cas graves de bec de lièvre au 5e mois il interpose un lambeau de muqueuse labiale entre les pôles et prescrit un contrôle stomatologique Dans les cas graves, l'opération du palais a lieu au cours de la 5e année de la vie et fait appel à la rétroposition et à la pharyngofixation.

L'auteur préconise des recherches internationales sur tous les problèmes soulevés par les becs de lièvre et les divisions palatines sous les auspices de l'UNESCO

Über die Herkunft von Deformationen und Aplasien des Oberkiefers nach Operationen von Lippen- und/oder Gaumenspalten. Franz Burian

An den Polen des Spaltes bestehen effektive Substanzmängel Die Wachstumspotenz der betroffenen Teile ist abgeschwächt Gewisse Verkleinerung des Oberkiefers kommt bei Menschen häufig vor sie ist nicht selten hereditar Wo alle Bedingungen zusammentreffen drohen ernste Spätadeformationen auch ohne Schädigung durch Operation. Das Zusammenbringen der Pole des Spaltes setzt die Deformation fest

Um das zu verhindern werden schwere Lippenspalten im fünften Monat operiert Oberkiefer wird dann orthodontisch kontrolliert bzw behandelt. Schwere Gaumenspalten werden ehestens im fünften Jahre operiert mit Retroposition und Pharyngofixation.

Autor regt internationale Forschung unter Schutz von UNESCO an.

Sobre los Transtornos del Crecimiento del Maxilar Superior en Operaciones de Fisura Palatina y Labial. Francis Burian

La hendidura palatina y labial estan asociadas a defectos reales en ambos polos. El crecimiento potencial de las partes afectadas se encuentra reducido Se observa a menudo un cierto grado de micrognocia a menudo hereditaria

Donde algunas o todas de estas condiciones individuales existe hay peligro de serias deformaciones tardías aun sin daño quirúrgico Al acercar los polos del maxilar puede establecerse la deformidad.

El autor ha operado labios en casos severos en el quinto mes interponiendo un colgajo de mucosa de labio entre los polos y aplicando control estomatológico El paladar en casos severos es operado en el quinto año usando retro-pulsión y faringeofijación.

El autor sugiere la investigación internacional en todos lo problemas de fisura bajo los auspicios de la UNESCO

Bone Grafting to Alveolar Process Clefts Following Orthodontic Treatment of Secondary Cleft Palate Deformity Karl-Erik Nordin, D D S, *Orthodontic Department, Royal School of Dentistry, Stockholm, Sweden*

In cases of cleft alveolar process and palate all the standard methods of closing the palate cleft are usually followed by a narrowing of the upper dental arch (See Figs. 194 A and B)

The teeth near the cleft are usually malposed and crowded. The alveolar bone between the cleft and the roots of the adjoining teeth is usually very thin

The current treatment of these deformities is of two types

1 Fitting of dentures designed to compensate for the contraction of the upper jaw (over dentures)

2 Orthodontic expansion of the upper jaw To obviate relapse after the orthodontic treatment this has to be followed by fitting of fixed bridges or partial dentures

In cases of bilateral clefts each of these two types of treatment is occasionally associated with the resection of the praemaxilla, when this is considered too unstable

Method developed by Bengt Johanson M D in collaboration with the author

In order to get a continuous, rigid alveolar process preventing relapse after orthodontic expansion and giving more room for the crowded teeth the following method is used

When orthodontic treatment has rendered the best possible relationship between the upper and lower dental arches (Fig 194 C) the alveolar

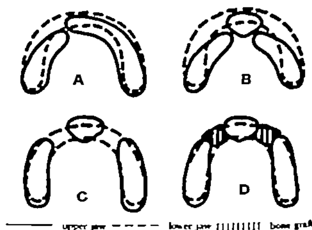


Fig 194

process clefts are closed by bone grafts (Fig 194, D)

Eight cases have been treated so far Four patients were aged 11 or 12 and had bilateral clefts with highly movable praemaxillae Of the four unilateral cases one patient was aged 14 and the others between 20 and 27 All of them had undergone Veau's operation on the lip and anterior palate at the age of about 2 months, and Ernst Axhausen's operation on the posterior palate at about 2 years There were two bilateral and one unilateral cases with lip operations by Abbé's method

Each of these patients had the typical secondary jaw deformity more or less pronounced (Fig 195)

Following orthodontic correction (Fig 196), bone blocks from the iliac crest were grafted to the defects in the alveolar process A fixation arch of 1 1 mm stainless spring wire, running along the labial surface of the maxillary dental arch between the two six-year molars (Fig 197) was fitted immediately after the operation It was attached by bands round the requisite number of teeth

To facilitate evaluation of the results we are making repeated follow-ups by means of

1 Plaster models of both jaws

2 Cephalometric X-ray pictures of the entire cranium, and separate X-ray pictures of the cleft regions These latter radiograms are taken with the aid of a specially designed device (Fig 198) that ensures identical stereoprojections at different times

In the bilateral cases the mobility of the praemaxilla was recorded by means of Muhlemann's periodontometer (Fig 199)

Results In six cases the mucosal flaps healed without defects, in two cases—one bilateral and one unilateral—defects arose, but they seem to be on the way to filling out with granulation tissue The block bone grafts have healed in nicely in each case After about two months we observed that the structure of the block bone

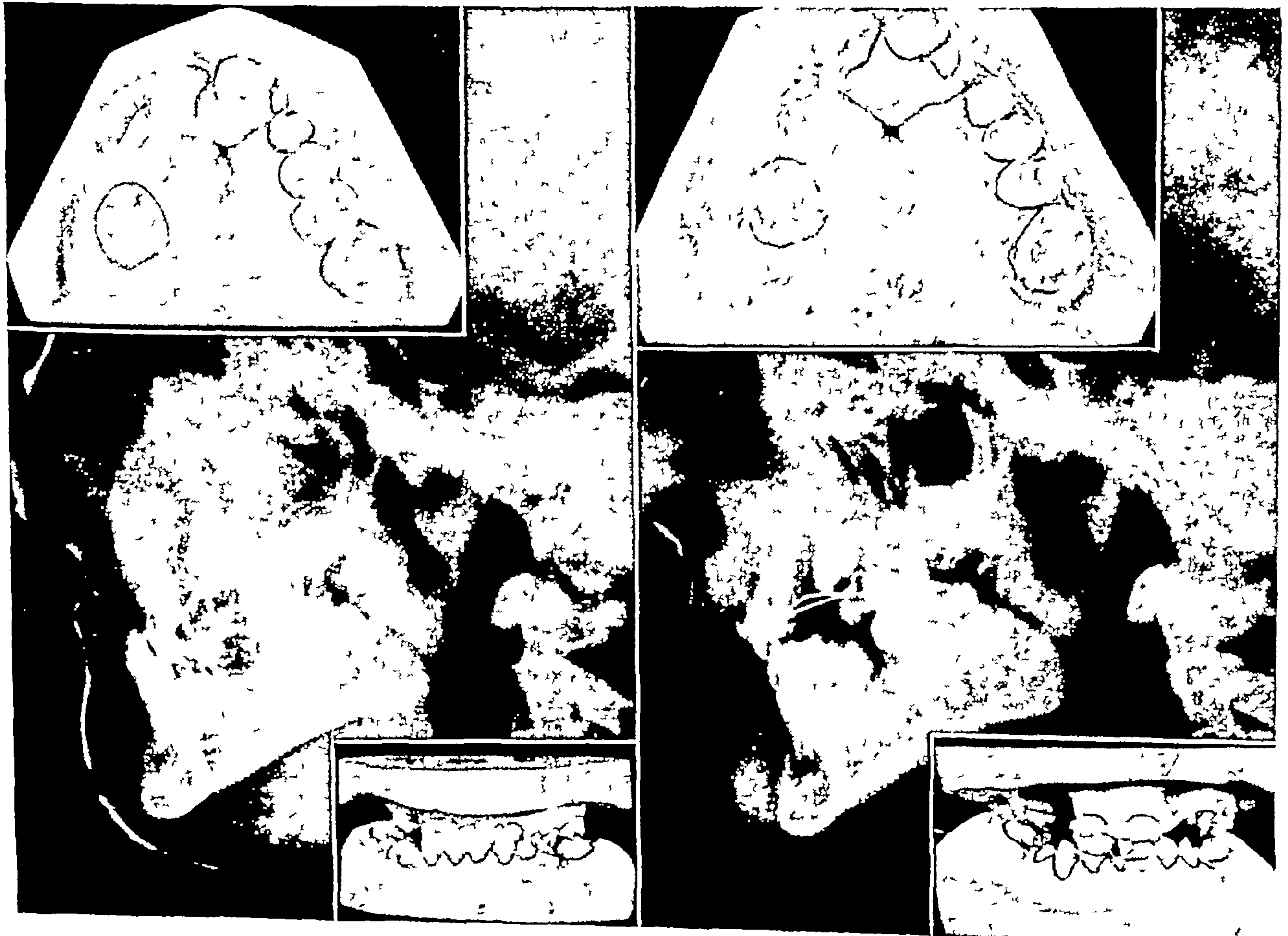


Fig 195 (left) Typical secondary jaw deformity following bilateral cleft palate
Fig 196 (right) The case shown in fig 195 following orthodontic correction



Fig 197 The case shown in fig. 196 (mirror inserted into the mouth to give back view of upper teeth)

grafts had undergone a change and resembled radiologically that of the surrounding bone (Fig 200)

Only in one case have we observed any appreciable resorption of the grafted bone blocks. This patient, the 14-year-old with the unilateral cleft was treated differently from the others insofar as only a short section of fixation arch was fitted at first being attached to the two teeth on either side of the cleft Within about three weeks there was a collapse of the lateral alveolar process on the cleft side, the process being shifted medially and approaching the situation that was present when the orthodontic treatment began. We re-inserted the orthodontic expansion appliance and the correct position was restored (Fig 201) The appliance was retained as a support and after this satisfactory healing occurred.

In one case there was sequestration of a surface bonechip but in this case too the block graft remained without resorption.

In the bilateral cases where the bone grafts were inserted shortly before eruption of the permanent canines, we were able to study this eruption.



Fig 198

In the eldest two of these patients the canines erupted in part through the grafts (Figs. 195 and 196) In one of them the mesial surface of the crown of the canine was exposed during preparation of the graft bed.

We retained the fixation appliances in these cases so that they could facilitate attachment of both the X ray device for identical projections and orthodontic appliances for correction of the obliquely erupting canines.

In two cases the praemaxilla which had previously been highly movable was found to be quite stable when tested. The other two bilateral cases have not yet been available for this examination.

As regards the risks of relapse of the results obtained by orthodontic expansion, it is too early as yet to form any opinion, but detailed studies will be made.



Fig 199

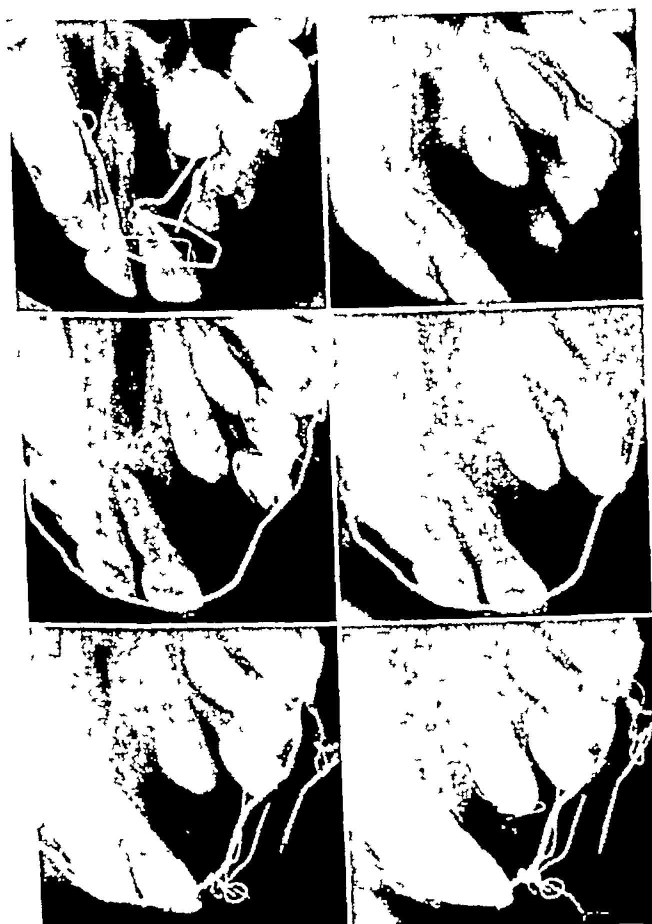


Fig 200 *Case G L*, born 1943 Bonegraft to cleft alveolar process January 1954



Fig 201 *Case K G A*, born 1941 Bonegraft to cleft alveolar process September 1954

Greffe Osseuse sur les Divisions du Processus Alveolaire Après Traitement Orthodontique de Malformations Secondaires par Divisions Palatines. Karl-Erik Nordin

Dans les cas de division palatine et de division du processus alvéolaire, toutes les méthodes standards de fermeture de la division palatine sont habituellement suivies du rétrécissement de l'arcade dentaire supérieure

Les dents aux abords de la division sont habituellement en malposition et se chevauchent L'os alvéolaire entre la division et les racines des dents adjacentes est fréquemment très mince

Le traitement courant de ces malformations revet deux types

1 Mise en place de prothèse dentaire destinée à compenser la contraction du maxillaire supérieur (surdenture)

2 Elargissement orthodontique du maxillaire supérieur Pour empêcher la récidive après traite-

ment orthodontique cet élargissement doit être suivi de la mise en place de brides fixes ou de prothèse dentaire partielle.

Dans les cas de division bilatérale chacun de ces deux types de traitement pourra être occasionnellement associé à la résection du prémaxillaire quand on estime que celui-ci est par trop instable

Dans le but d'obtenir un processus alvéolaire continu et rigide qui empêchera la récidive après expansion orthodontique et qui donnera beaucoup plus de place aux dents qui se chevauchent les auteurs utilisent la méthode suivante

Une fois que le traitement orthodontique a rétabli les meilleurs rapports possibles entre les arcades dentaires supérieure et inférieure on ferme à l'aide de greffes osseuses les divisions du processus alvéolaire Des compte-rendus de cas illustrent cette méthode et l'exposé est suivi d'une discussion des résultats après une période d'observation ayant pu atteindre 18 mois

Knochentransplantationen bei Spalten des Alveolarfortsatzes nach vorheriger Orthodontischer Behandlung sekundärer Gaumenspaltendeformität. KARL-ERIK NORDIN

In Fällen von Spalten des Alveolarfortsatzes und des Gaumens führten die gebräuchlichen Methoden des Spaltverschlusses gewöhnlich zu einer Verengung des oberen Zahnbogens

Die Zähne nahe der Spalte sind gewöhnlich in schlechter und gedrängter Stellung. Der Knochen der Alveole zwischen der Spalte und den Wurzeln der benachbarten Zähne ist meistens sehr dünn. Zur Zeit gibt es bei dieser Deformität zwei Arten von Behandlungsmethoden

1 Eingliederung von Platten dazu bestimmt, die Kontraktion des Oberkiefers zu kompensieren

2 Orthodontische Dehnung des Oberkiefers. Um ein Rezidiv nach der orthodontischen Behandlung auszuschliessen, muss dieser die Eingliederung festsitzender Brückenoder partieller Prothesen folgen.

In Fällen von doppelseitigen Spalten kann jeder dieser beiden Behandlungsmethoden gelegentlich mit der Resektion des Zwischenkiefers verbunden werden, wenn dieser als nicht genügend stabil angesehen wird

Um einen kontinuierlichen starren Alveolarfortsatz zu erzielen der einen Rückfall nach der orthodontischen Ausdehnung verhindert und mehr Raum für die gedrängten Zähne gibt, wird folgende Methode angewandt

Nachdem die orthodontische Behandlung eine bestmögliche Beziehung zwischen oberen und unterem Zahnbogen erzielt hat wird die Alveolarfortsatzspalte mit Knochentransplantaten geschlossen. Diese Methode wird durch Krankengeschichten illustriert und eine Diskussion der Ergebnisse auf Grund von Beobachtungen über einen Zeitraum bis zu 18 Monaten wird angeschlossen.

Injerto Oseo para las Fisuras de la Apofisis Alveolar Despues del Tratamiento Ortodonsico de Fisura Palatina KARL-ERIK NORDIN

En casos de fisuras de la apófisis alveolar y paladar todos los métodos usuales de tratamiento son seguidos por estrechamiento del arco dental superior

Los dientes colocados cerca de la fisura casi siempre están mal implantados y apiñados. El hueso alveolar entre la fisura y las raíces de los dientes vecinos es muy delgada.

El tratamiento corriente de esas deformidades es de dos tipos

1 Dentaduras diseñadas a propósito para compensar la contracción de la mandíbula superior (sobre-dentadura)

2 Expansión ortodonsica de la mandíbula superior Para evitar la residiva después del tratamiento ortodonsico esto debe continuarse con la aplicación de puentes fijos o dentadura parcial.

En casos de fisuras bilaterales, cada uno de estos dos tipos de tratamiento se asocia ocacionalmente con la resección del premaxilar cuando este es considerado inestable.

Se usa el siguiente método para dar una apófisis alveolar continua y rígida previniendo la recaida después de la expansión ortodonsica y dando mayor espacio a los dientes apiñados

Una vez que el tratamiento ortodonsico ha dado la mejor relación posible entre los arcos dentários superior e inferior la fisura la apófisis alveolar se cierra con injertos de hueso El método se ilustra con los casos reportados y se presenta la discución de los resultados observados por un periodo de ma de 18 meses

---

Teratoma of the Upper Lip (with an associated cleft lip and cleft palate) Case Report.

CHARLES E. GURNEY, M D *401 Medical Arts Building 1020 S W Taylor St Portland 5, Oregon.*

A teratoma may be defined as a benign neoplastic growth composed of well-differentiated tissues—usually from all three germ layers—but without any organization of the tissues into mature organs The tumor is characterized by a chaotic arrangement of the structures within its borders It may contain bits of bone cartilage hair teeth glands or fragments of any other tissue of the body—but only as fragments (except teeth)—never as a completed structure. They usually develop during prenatal life and have a predilection for certain parts of the body—namely testes ovary sacral region, vagina mediastinum kidney and lungs. Teratomas

sometimes go by the names "embryoma," or "mixed tumor", and they are also occasionally referred to rather loosely as "dermoid cysts" Confusion might be lessened by reserving the term "dermoid cyst" for those cysts lined by stratified squamous cell epithelium and filled with products of exfoliation from the skin structures

The author recently cared for a child who was born with a large growth attached to the upper lip—associated with it was a cleft lip and cleft palate The growth proved to be a teratoma containing tissues from all three germ layers—gland, bone, cartilage, tooth, brain tissue and fat A diligent search through the literature has failed to reveal a single case similar to this—hence, the present paper concerns itself with reporting this interesting and unusual case

Case History

The patient, when first seen, was a one-day-old male child He was full term, delivery was normal, and his birth weight was seven pounds, nine and one-half ounces He had one brother (normal) twenty-two months of age, and there was no family history of congenital deformities

The outstanding finding on physical examination was a huge, rather rubbery tumor attached to the region of the upper lip It measured 45 0 mm by 45 0 mm and projected forward in front of his face 51 0 mm The skin over the growth was smooth, rather velvety and contained fine hairs

The tumor was attached to the upper lip region by a broad base Superiorly it extended to the nose where the proximal four-fifths of the columella was incorporated in the tumor It crowded upon the nostril openings, causing partial obstruction to breathing On the left it extended to a point below the alar attachment To the right it extended to the next most interesting finding—a complete cleft of the lip The tumor extended to the right far enough to cover the cleft opening completely Inferiorly the attachment of the growth extended to a point several millimeters below the normal line of the mouth—causing some obstruction to breathing (Fig 202)

The alveolar process in the region of the upper lip was greatly thickened in the antero-posterior direction, laterally and also vertically



Fig 202 Views of patient at one day of age—showing relationship of teratoma to nose and mouth

The alveolar process was not cleft as was the lip on the right side One could palpate a bony prominence in the tumor—especially on the left side Radiographs of this area revealed "a tumor mass arising from the anterior midline region of the maxilla It is roughly spherical in shape and approximately 4 5 cm in diameter Bone structure is demonstrated in the lower central portion of the tumor mass, and the lateral projection appears to be continuous with the maxilla The presence of tooth buds within this irregular mass suggests that the tumor is in the nature of a teratoma The bone structure in the malar regions and in other than the anterior portion of the maxilla appears to be normal with well developed nasal bones Skull shows no abnormalities" (Fig 203)

There was a cleft of the palate, extending through the soft palate, and a bilateral cleft of the hard palate, extending forward almost to the alveolar process The general physical examination of the patient revealed no other abnormalities, and the laboratory work was within normal limits Since the child was having some difficulty breathing, it was thought advisable to remove the tumor without delay

When the child was two days old, the tumor was removed under endotracheal anaesthesia (gas-ether) Skin flaps were designed on the upper and lower surfaces of the tumor for use as lip tissue at a later date The projecting bone was cut off at the level of the anterior surface of the maxilla The thickened maxilla was not attacked at this time No muscle fibers were seen in the region where the lip should be A small cystic area was encountered in the pre-



FIG 203 Roentgenograms showing normal skull but with bony projection into teratoma



FIG 204 Child at two months of age—with tumor removed.

maxilla The flaps were sutured over the maxilla —there being no attempt at this time to give shape to the lip (Fig 204)

The pathologist's report confirms the clinical diagnosis of teratoma and reads in part, the inner portions of the tumor are cystic and they are multiple. The tissue is everywhere benign in character Several of the structures which are not submitted for microscopic preparations resemble bone and in one instance a tooth. Further sections show adipose tissue and small fragments of cartilage and voluntary muscle Diagnosis Teratoma of upper lip"

During the next two and one-half years the child was returned to surgery six times for correction of the hypertrophied maxilla, repair of cleft lip closure of the cleft palate, construction of the columella, and further reshaping of the lip and nose His last operation was at three years of age.

At his last visit his speech was good. There were no complaints There should be a little more work done on the lip and nose—probably before he starts to school (Fig. 205)

SUMMARY

A case is reported in which a large teratoma replaces the tissues of the upper lip—in a male child with an associated unilateral cleft lip and bilateral cleft of the palate

Teratome de la Lèvre Superieure. (Associé à un Bec de Lièvre et à une division palatine.) CHARLES E GURNEY

Un tératome tumeur néoplasique bénigne composée de tissus bien différenciés—provenant habituellement des trois couches germinales—mais sans aucune organisation tissulaire sous forme d organesmatures se caractérise par

1 Un arrangement chaotique des formations structurales le long de ses bords qui peuvent contenir des traces ou des fragments de n'importe quel tissu du corps exceptionnellement une structure complète et

2 Un développement habituel au cours de la vie prénatale dans certaines parties de l organisme

L auteur a eu récemment à soigner un enfant né porteur d'une grosse masse fixé sur la lèvre supérieure et coexistant avec un bec de lièvre et une division palatine masse qui s est révélé être un tératome qui contenait des tissus développés



FIG 205 Patient at three years of age

aux dépens de toutes les trois couches germinales

Compte-rendu du cas Garçonnet (SH) né avec une énorme masse tumorale fixée à la lèvre supérieure et coexistant avec un bec de lièvre droit complet et une division palatine bilatérale sans aucune autre malformation La tumeur mesurait 45 x 45 x 51 millimètres et obstruait partiellement le nez L'enfant subit une série d'interventions et guérit sans histoire

Teratom der Oberlippe (verbunden mit Lippen- und Gaumenspalte). CHARLES E GURNEY

Ein Teratom (eine gutartige Geschwulstbildung aus gut differenziertem Gewebe zusammengesetzt und gewohnlich von allen drei Keimblattern—aber ohne irgendeine Ausdifferenzierung der Gewebe zu reifen Organen) wird charakterisiert durch

1 Chaotische Anordnung der Gebilde innerhalb seiner Grenzen, die kleine Teilchen irgendeines Korpergewebes enthalten konnen—aber nur als Fragment, selten als fertiges Gewebe und

2 Gewohnlich entwickelt es sich in gewissen Teilen des Korpers vor der Geburt

Der Autor hatte kurzlich ein Kind in seiner Behandlung, das mit einer grossen Geschwulst an der Oberlippe geboren war-verbunden mit Lippen-Gaumenspalte-das sich als Teratom mit Geweben von allen drei Keimblattern herausstellte

Krankengeschichte Mannliches Baby (SH) geboren mit einer grossen Tumormasse an der Oberlippe vergesellschaftet mit einer vollstandigen rechtsseitigen Lippenspalte und einer beiderseitigen Gaumenspalte ohne anderweitigen Abnormitaten Der Tumormass 45 45 51 mm Teilweise Verlegung der Naseneingange Das Kind machte eine Serie von Operationen mit ungestorter Rekonvaleszenz durch

Teratoma del Labio Superior (asociado con fisura labiopalatina). CHARLES E GURNEY

Un teratoma (crecimiento neoplásico compuesto de tejidos bien diferenciados, casi siempre de las tres capas germinales, pero sin la organización de los tejidos de los órganos maduros) es caracterizado por

1 Disposición caótica de las estructuras que pueden contener fragmentos pequeños, de cualquier tejido del cuerpo y

2 Desarrollados casi siempre durante el período prenatal en ciertas partes del cuerpo

El autor vió recientemente un recién nacido con un gran crecimiento adherido al labio superior, asociado con fisura labio palatina, que era un teratoma conteniendo tejidos de las tres capas germinales

Historia del caso Niño del sexo masculino que nació con un gran tumor adherido al labio superior y asociado con fisura labial del lado derecho y fisura palatina bilateral El tumor media 45 x 45 x 51 mm, obstruyendo parcialmente la nariz El niño sufrió una serie de operaciones con recuperación parcial

III

JAWS

Reconstructive Surgery of the Lower and Upper Jaw EDUARD SCHMID, Dr med, Dr med dent *Marienhospital Böheimstrasse 37, Stuttgart-5, Germany*

In large defects we have performed reconstruction of the jaws according to the following basic principles

First the newly formed jaw should be reconstructed in such a manner as to enable the patient to wear a prosthesis and to chew with it

Second cosmetically important soft tissues are if at all possible to be replaced from the vicinity of the defects.

Third the original prominence of the ridges of the lower and upper arches of the jaws should be reformed

With regard to the first point it is obvious that, after the continuity of the jawbone has been restored the patient (Fig 206 A and B) is yet unable to wear a prosthesis and further surgery to this end is indicated For this purpose we implant additional bone grafts, preferably by the oral approach, for building up the missing alveolar ridges.

After healing, a new oral vestibule is constructed by means of Esser inlays (Fig 206 D) This patient (Fig 206 E) with an almost total loss of the lower jaw is now able to wear a prosthesis

Figure 206 F shows the X rays of the same case. In connection with the second point we report two patients (Figs 207 208) in whom the soft tissues of the new chin gained from the vicinity of the original defect were primarily formed over a mold Later-on a tunnel was formed running from one angle of the mandible to the chin, in the anterior border of the ascending ramus of the mandible a groove was formed into this a bone graft was inserted and imbedded under tension so as to protrude the chin anteriorly In case the ascending mandibular branches are too short, they first have to be prolonged by additional implantation of bone grafts (Fig 208)

In the next patient we used a method that has proved easier and even more satisfactory in realisation of the third point. We have first restored the osseous arch of the mandibular body by implanting a bone graft from either angle of the mandible into the limbs of a tubed pedicled flap which run to the proposed tip of the chin (Fig 209 B)

Subsequently a visor flap was raised from the skin of the neck and was shifted upward across the newly formed solid tip of the chin to replace the lower lip Its oral raw surface was immediately lined with skin from the tubed pedicled flap forming the new mandibular arch and with mucous membrane from the cheeks. Then, with bent pieces of rib cartilage an alveolar ridge was established and finally a new oral vestibule was obtained with Esser inlays (Fig 209 F) A well fitting prosthesis could then be worn

In the next patient (Fig 210) the right horizontal branch of the lower jaw and part of the zygoma were missing The form of the latter was restored by intraoral implantation of a cartilage graft.

The patient in Fig 211 had suffered a loss of more than two thirds of the palate for which reason the lip had fallen back badly The profile shows the condition after implantation of a tubed flap through the mouth and after a vaulted graft from the iliac bone had been implanted which later-on could be attached to the remaining skeleton

The X ray film shows the reconstructed osse-

Fig 206 A and B show the condition on admission C State on discharge D The lower jaw is reconstructed including oral vestibule and alveolar ridge E Patient wearing denture F X-ray shows loss of right part of lower jaw G (lower right) Lost part together with alveolar ridge reconstructed



Fig 208 A and B show the condition on admission C Final appearance D Profile view on discharge E X-ray photo of the reconstructed lower jaw It does not show the alveolar arches as these were re-established by cartilaginous implants

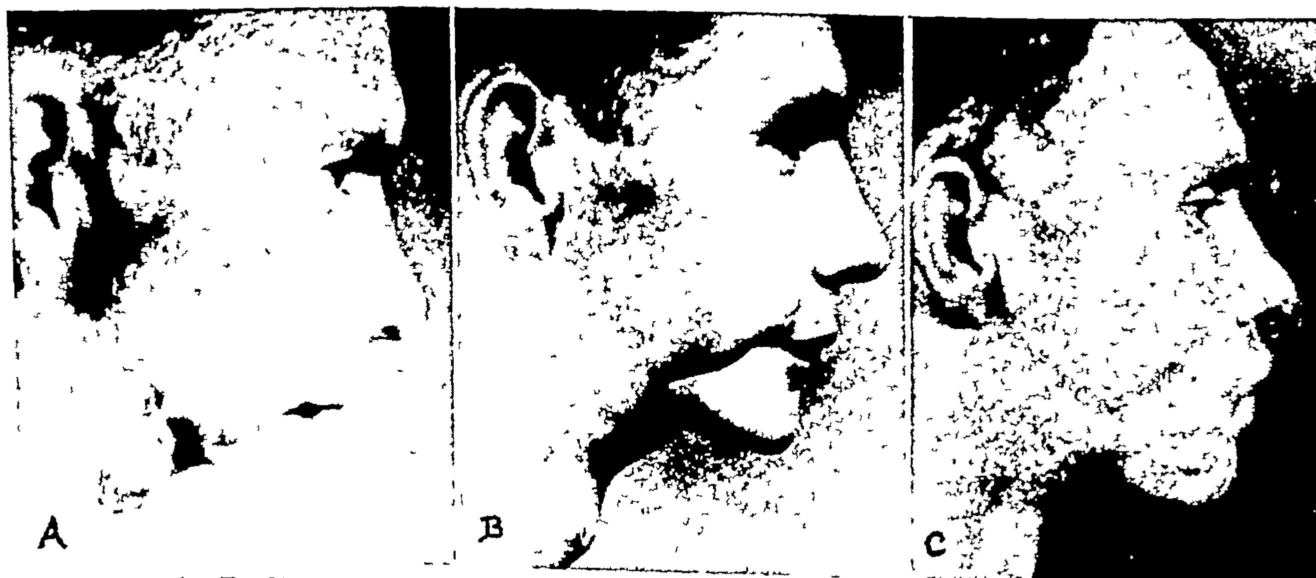


Fig 207A Profile view on admission B Mold, over which the soft tissues are to be formed, in place C After replacement of soft tissues, gained mainly from vicinity



Fig. 209 A Condition after injury B Construction of the horizontal lower jaw including chin. C and D Final appearance E. X-ray photo of the new osseous chin-bow F View of the reconstructed alveolar ridge G X-ray photo of the new osseous chin-bow



Fig 210 A. and B Condition on admission (ankylosis from scar-contracture) C and D Post operative appearance

ous upper jaw Later this graft served as substructure for the erection of a supporting nasal framework.

Fig 212 shows destruction of the left lower jaw as well as of the upper jaw After restoration of the basic arch the left crest of the mandible was reconstructed by intraoral implantation of a bone graft (Fig 212 E and G) For the replacement of the lost soft tissues of the palate a tubed flap was inserted. The palatal vault was restored with a carved iliac bone graft. This graft was then united to the zygomatic arches of both sides As a next step the skin as well as the subcutaneous fatty tissues covering the newly formed upper jaw were cut away and the bone itself was covered with a Thiersch skin graft in order to obtain a firm, solid base for the prosthesis (Fig 212 D and F)

The principles according to which we reconstruct large defects of the middle face are shown in Fig 213 After preparation of the tubed flap, which is pedicled at the one end and which at its free end is lined with epithelium on both sides the soft palate was re-established. And by means of a visor flap raised from the skin of the neck and shifted upward above the chin, the upper lip was formed. In order to maintain the form and for the support of the soft tissues a supporting mold (Fig 213 B) was required until the iliac bone graft had healed in place of the hard palate and had been attached by additional bone chips to the remaining skeleton (Fig. 213 C) Then the reconstruction of the nose followed according to the technic described in "Bruns Beiträge zur Chirurgie" in 1951

Fig 214 shows reconstruction of the middle-part of the face according to the same principles. The X ray photos show the reconstruction of the upper jaw and the nose

These war time experiences were made use of in the management of the underdeveloped mid

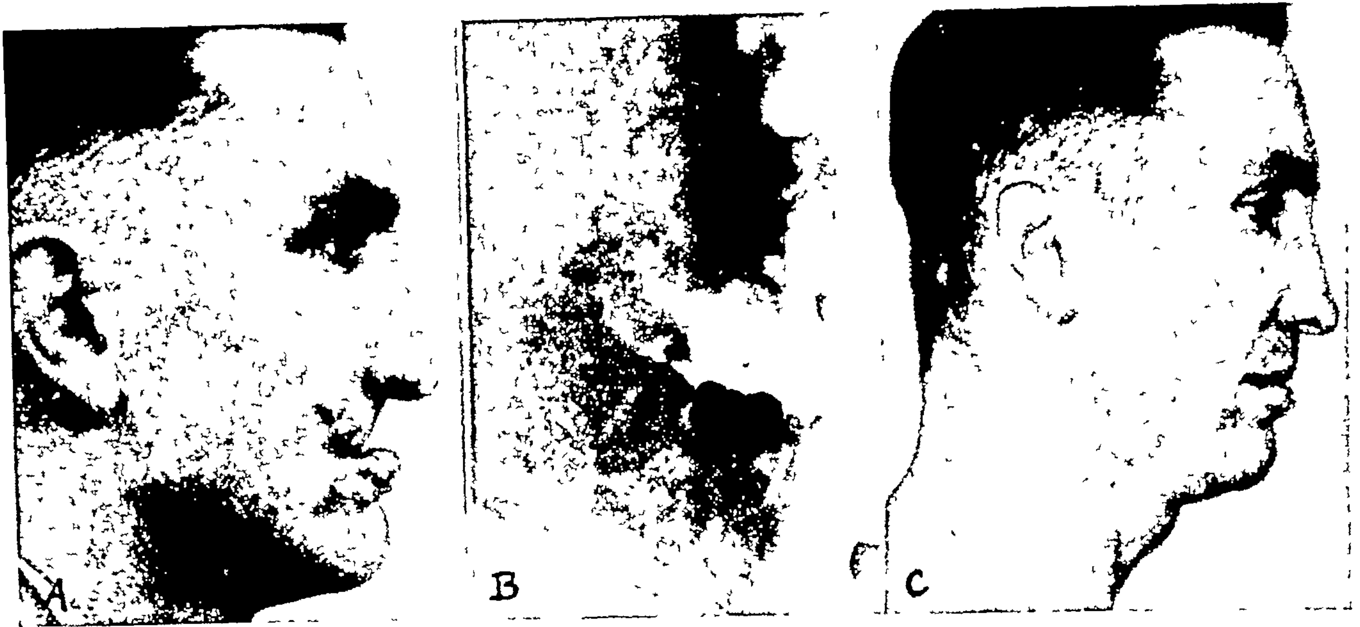


Fig 211A Bony defect of the front part of the upper jaw B X-ray taken after reconstruction of the bony defect C Postoperative appearance of patient, showing elevated basis of upper lip



Fig 212 A View of the palate prior to reconstruction B Retruded base of the upper lip due to total loss of the hard palate C Condition after reconstruction of the palate and fitting of denture D View of reconstructed palate with alveolar arch and newly formed oral vestibule E Defect of the alveolar ridge of left lower jaw Scar-adhesions of the mucous membrane of the floor of the mouth to that of the cheek F With denture fitted in the upper and lower jaw patient is able to chew G The lost olveolar arch is re-established and a new oral vestibule formed In the maxilla the height of the reconstructed alveolar ridge is to be seen

dle face of patients with cleft lips and palates (Fig 215) The course of such a procedure is described here

The compressed and displaced parts of the jaw (Fig 215, A and C) are surgically mobilized and brought into the best position of dental occlusion with the lower jaw After soft tissue-closure of the anterior gaps in the mucosa (Fig 215, B) we achieve an anterior stabilization of the dental arch by implantation of a bone graft (E) At the same time an elevation of the fallen-in base of the upper lip is achieved A new osseous anterior arch is also of paramount importance as a framework for elevation of the nose, to be performed later (Fig 215, F and G)

In another case we aimed at a prophylactic prevention of the development of secondary deformations by filling out the gaps between the underdeveloped stumps of the maxilla with the intraoral implantation of bone grafts subsequent to the correction of the position of the intermaxillary bone (Fig 216) Our experience with this procedure is now in its fifth year So



Fig. 213 A Defect of upper jaw upper lip cheek and nose B Restoration of the soft tissues upper lip and palate with supporting mold. C X ray-photo after reconstruction of the upper jaw D Bony parts replaced nasal reconstruction in progress. E. Final result.

far the hope is justified that grave secondary disfigurements may be avoided in the future

Finally Fig. 217 shows the treatment of a bilateral cleft lip and palate. Behind the inter maxillary bone lies the badly narrowed palatal vault (Fig 217 D) The latter was widened by orthodontic means to such an extent, that the deciduous teeth have come to normal dentition (Fig 217 E-H) The intermaxillary bone needs not and in my opinion should not be surgically set back, as we are convinced that if it is joined by force and united with the underdeveloped lateral stumps of the maxilla the whole upper jaw will later-on remain too small As in unilateral clefts a residual gap will also remain in bilateral clefts, according to the degree of under development of the case in question. We fill out these gaps with bone grafts after the palate has been expanded.

La Chirurgie Réconstructrice des Maxillaires Inferieurs et Superieurs. Eduard Schmid.

Compte-rendu du traitement chirurgical utilisé pour la réconstruction des grandes pertes de substances tant du maxillaire inférieur que supérieur On s'est particulièrement efforcé d obtenir non seulement un bon résultat fonctionnel mais encore un résultat esthétique satisfaisant.

On a considéré comme essentiel dans chaque cas particulier de rendre le maxillaire néoformé capable de supporter une prothèse

Dans ce but on a implanté un supplément d os et de cartilage pour rétablir les arcades dentaires après la reconstruction eds bases osseuses

Dans les pertes de substances de la partie moyenne de la face on a pratiqué une restauration de la base osseuse de la lèvre supérieure qui a permis le redressement des parties molles pendantes du nez à l aide soit d'un échafaudage de support ou même d une reconstruction nasale totale Pour terminer on fait un compte-rendu préalable sur les greffes osseuses destinées à empêcher les déformations chirurgicales secondaires du maxillaire à la suite de la fermeture chirurgicale des divisions

Die Chirurgische Wiederherstellung des Unter- und Oberkiefers. Eduard Schmid.

Es wird über die chirurgische Behandlung zur Wiederherstellung grosser Defekte des Ober und



Fig. 214A. Condition on admission. B and C X-ray-photos before and after reconstruction of upper jaw and nose. D Final appearance

Unterkiefers berichtet Dabei wurde besonders darauf geachtet, sowohl ein gutes funktionelles als auch ein befriedigendes kosmetisches Ergebnis zu erzielen

In jedem einzelnen Fall wurde als wesentlich angesehen, den neugebildeten Kiefer prothesenfahig zu gestalten

Um dieses zu erreichen, wurden zusatzlich Knochen und Knorpelimplantate eingepflanzt, um die Kieferkamme wiederherzustellen, nachdem die knocherne Grundlage geschaffen worden war Bei Defekten des Mittelgesichts ermoglicht eine Wiederherstellung der knochernen Basis der Oberlippe die Aufrichtung des zusammengefallenen Weichgewebes der Nase mittels eines Stutzgerustes und gegebenfalls auch den Aufbau einer total zerstorten Nase

Zuletzt wurde uber Versuche mit Knocheninlays berichtet, die zum Zwecke der Verhinderung von sekundaren Kieferdeformierungen nach dem operativen Spaltschluss ausgefuhrt werden

Cirugía Reconstrucora de las Mandíbulas Superior e Inferior. EDUARD SCHMID

Se hace un reporte del tratamiento quirúrgico usado para la reconstrucción de grandes defectos de las mandíbulas superior e inferior Se dio especial atención para obtener un buen resultado tanto funcional como estético

Se consideró esencial en cualquier caso simple, obtener una mandíbula neoformada capaz de sostener una prótesis

Para llevar a cabo esto, se implantó hueso y cartílago como injertos, con el propósito de restaurar los arcos dentarios una vez que se había efectuado la reconstrucción de las bases óseas

En defectos de media cara, la restauración de la base ósea del labio superior hace capaz el levontamiento de los tejidos blandos caídos de la nariz por medio de una armazón de soporte y aun de la reconstrucción nasal completa

Finalmente se da un reporte preliminar de injertos óseoa implantados con la mira de prevenir las deformaciones secundarias de la mandíbula despues del cierre quirúrgico de fisuras

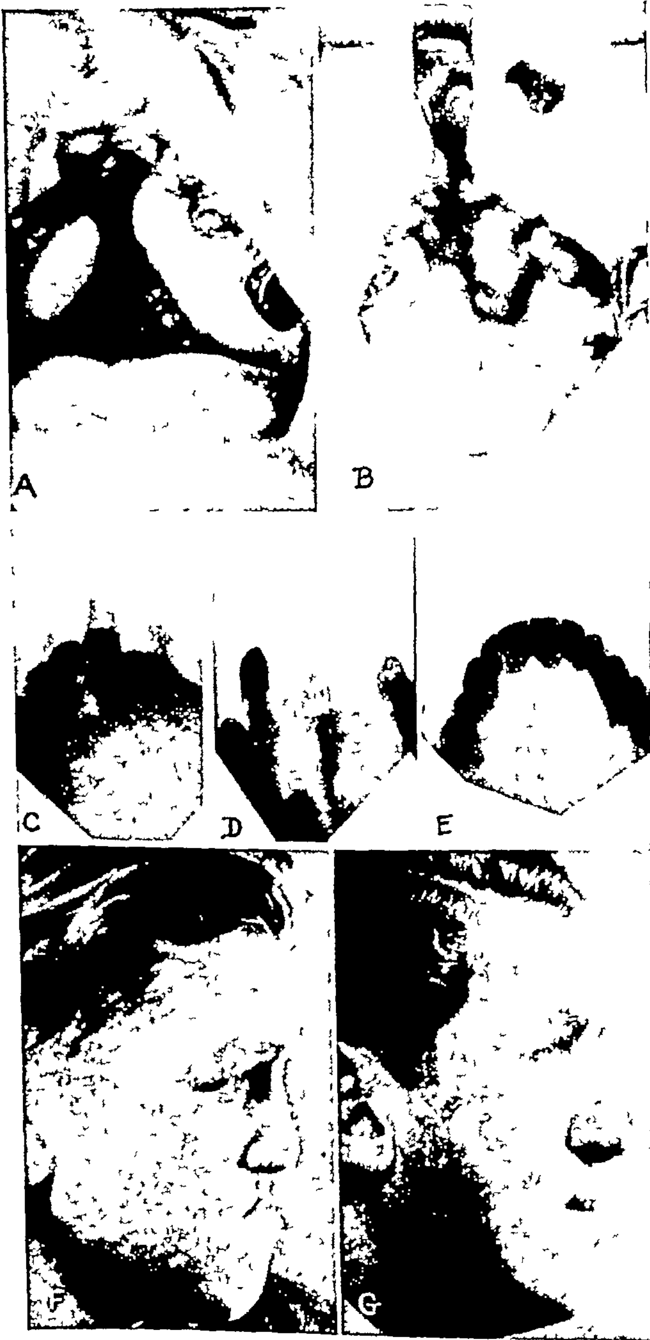


FIG 215 A Constriction of alveolar arch in a bilateral cleft B Widening by osteotomy, closure of palatal cleft C X-ray-photos (from left to right) original condition D Compressed and narrow arch relieved by osteotomy and extraction of single carious incisor tooth E Bony implants stiffening the mobilised stumps, denture fitted F and G Profile view on admission and postoperative upper lip reconstructed, nasal framework erected on the newly formed jaw-substructure

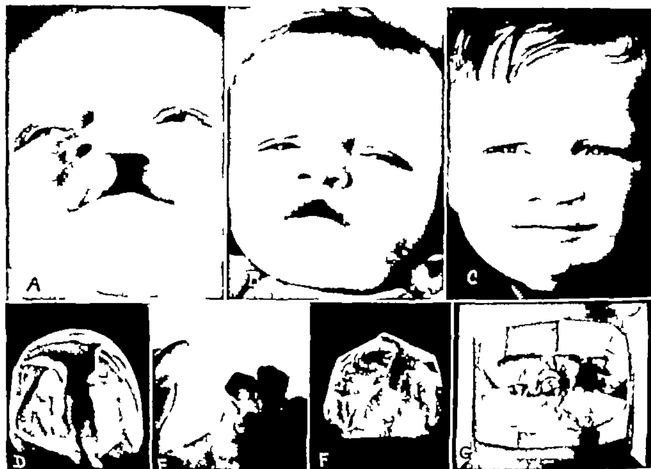


Fig. 216A Cleft lip the intermaxillary bone is rotated anteriorly B Result 18 days postoperatively C Appearance of the child at the age of 2½ years. D Model of maxillary cleft The small stump is apparently underdeveloped. E For preservation of the gap it is stabilized with a bony cross-bar F Model of the upper jaw after incorporation of the intermaxillary bone into the alveolar-arch and after implantation of the bone graft G The preservation of the gap permitted a good adjustment of the deciduous denture.



Fig 217A Bilateral cleft Columella missing B Appearance after closure according to Wassmund-Veau (short upper lip) C Upper lip has grown spontaneously to normal length Result of erection of the alae and forming of the nasal tip (appearance at the age of 5) D Model of the primarily narrow-cleft maxillary arch after closure of the cleft palate E Result of orthodontic widening of the maxilla at the age of 5 years F View of the broadened dental-arch G View of the widened palatal vault H Present state of occlusion (slight incisive overbite)

Ramisection as an Aid to Dental-Orthopaedic Correction of Mandibular Protrusion. Remarks upon Indications and Technique on the basis of *Results of a Follow up Study* KARL-ERIK HOGEMAN, M D, *The Department of Plastic Surgery, Allmänna Sjukhuset, Malmo, Sweden*

The treatment of mandibular protrusion in the adult through team work between dental orthopaedics and surgery can lay claim to a century long tradition following *Hullihen's* publication in 1840 but has not actually been developed until after *World War I* Surgery is here an adjuvant method by mobilization of the mandibular skeleton facilitating an instantaneous orthopaedic correction of the occlusion.

Mandibular protrusion is a purely symptomatic diagnosis comprised of several clinical conditions Our definition of the term derived from a study of one hundred and seventy cases is given as follows

Mandibular protrusion in the clinical sense implies that when the teeth are in contact and the articular condyles are in normal position there is in the sagittal occlusion an inverted horizontal overbite anteriorly and a disfigurement of the facial profile due to the profile forming part of the mandible being protruded beyond the profile outline of the maxilla

When assessing the indications for surgical-orthopaedic correction of the individual case the occlusion as well as the facial profile are of main interest whereas the decision as to the most applicable type of surgical mobilization of the jaw is influenced mainly by the profile analysis demonstrating which jaw is most "responsible" for the seeming protrusion of the mandible The evaluation as to the appropriate type of therapy should be rendered by a qualified dental orthopaedist on the basis of a thorough analysis of the indications comprising the following factors

The clinical type of mandibular protrusion.

The subjective symptoms.

The chances of improving the occlusion and the facial profile.

The age of the patient

The psychic condition of the patient.

Social and financial circumstances

Concerning the first point Table 1 will summarize a survey of clinical types of mandibular protrusion Out of these two conditions are particularly subjected to contradictory opinions as regards surgical-orthopaedic correction, i.e the relative protrusion of the mandible in cases of operated cleft palate and harelip and the macrognathous lower jaw in acromegaly

TABLE 1 CLINICAL FORMS OF MANDIBULAR PROTRUSION

Primary (idiopathic) mandibular protrusion

Secondary (symptomatic) mandibular protrusion

A Hereditary and congenital malformations
  a Cleft palate and hare-lip
  b Macroglossia (hemangioma lymphangioma)
  c. Achondroplasia (fetal chondrodystrophia)
  d. Cleidocranial dysostosis (*Crouzon's disease*)
  e Oxycephaly (craniostosis)
  f Leontiasis ossea (*Virchow*)

B Endocrinopathy
  a Acromegaly
  b Eunuchoid gigantism (hypogonadism)
  c Cretinism

C Posttraumatic forms
  a. Fractures (mandibular maxillary)
  b Scar tissue contracture (chin and neck)
  c Hypertrophy of the mandibular condyle

D Postinfectious form
  Mandibular infection (osteomyelitis)

Many writers claim that relative protrusion resulting from surgical closure of cleft lip and palate must be corrected prosthetically after orthopaedic widening of the maxilla This may prove quite valid in some cases but in others, a very marked underdevelopment of the maxilla defies such conservative treatment. Here surgical-orthopaedic measures are mandatory

Acromegalic mandibular protrusion is considered by most to be contra indicative to active therapy However in some rare instances characterized by loss of mastication function together with malnutrition or intestinal disorders, even though relapse will occur temporary bite correction by means of orthopaedic surgery can be effected.

Subjective symptoms such as disturbed mastication and speech, gastro-intestinal malfunctioning or psychological maladjustment are considered by us to provide sufficient impetus for initiating corrective treatment Quite often, patients exhibiting only slight mandibular protrusion also complain of inferiority feelings. We in Sweden, in contrast to many abroad, are quite

sympathetic and accept this as adequate motivation for commencing treatment.

Pre-operative dental-orthopaedic analysis which includes establishment of a possible new bite, determines the pattern of dental correction required to obtain a stable and efficient occlusion. In determining a new occlusal position, the factor of major importance is consideration of a site which affords not only the best articulating position but which also provides harmony of lines in profile and symmetry in the full face aspects. In some cases, therefore, the frontal overbite must be modified in order to counteract a receding chin, in others an asymmetric mandible with deviating chin must be corrected by the new occlusal position. A second important consideration is awareness that during the first post-operative year inclination of the lower incisors becomes somewhat reduced. We have found that the degree of this reduction is correlated to the extent of posterior shifting of the mandibula and is due to increased pressure of the tongue against the anterior lower teeth after the oral cavity has been decreased. In cases of marked protrusion with great lingual inclination of the lower incisors, the horizontal bite must be over-corrected in order to compensate for this future movement.

The age-factor is subject to dispute. Although most writers state surgery to be contraindicated before the jaws have ceased growing, we feel that surgical-orthopaedic correction is indicated as soon as possible in every case of mandibular protrusion where orthodontic measures prove inadequate. The only requirement demanded is the eruption of a satisfactory number of permanent teeth for intermaxillary fixation, which requirement is usually fulfilled by the age of twelve. Early initiation of surgical-orthopaedic treatment eliminates the possibility of negative factors predominating over the psychological development of the individual during puberty. In addition, such early correction of the bite makes possible further orthodontic control of future harmonious development of the jaws.

Psychologically as well as somatically, the patients must be prepared for the course of therapy. Though a neurosis arising from a facial deformity may actually serve as a positive factor, patients exhibiting established psychotic tendencies are quite unacceptable for treatment.

Social and economic factors may sometimes affect the motives for treatment. Orthodontic treatment would sometimes be the method of choice but is quite expensive and thus limits the likely number of patients. Surgery is less expensive but the time required for post-operative treatment may sometimes prove too long for a common laborer.

In regard to surgical technique three methods are employed: (1) reduction of the mandible by corpus resection, (2) mobilization of the mandible by means of operation on the ramus (ramisection and condylar resection), and (3) mobilization of the maxilla by osteotomy.

Resection of the mandibular condyle is anatomically unsound, and is indicated only in those cases of protrusion in which unilateral or bilateral hypertrophy of the condylar head exists. *Axhausen's* mobilization of the maxilla is justified only in cases of relative protrusion following malunion of maxillary fractures.

Some writers consider ramisection to be disadvantageous because it produces an upward rotation of the superior fragment of the ramus with the risk of pseudoarthrosis, reduced articular function, and tendency towards open bite. Another drawback is the possibility of injuring the facial nerve in the course of surgery. For these reasons corpus resection is elected by them as the method of choice.

This attitude towards ramisection is quite unjustified in the light of our experience. In a series of 170 cases, upward rotation of the superior fragment of the ramus caused no functional disturbances in the temporo-mandibular joints. Pseudoarthrosis was evident unilaterally in only four cases and bilaterally in one. Of interest was the fact that no secondary dislocation of the corrected bite occurred in any of these cases, and subjective symptoms consisting of a slight stinging sensation of one side when articulating was reported only in the case of bilateral pseudoarthrosis. No significant occurrences of secondary open bite appeared. Persistent lesion of the facial nerve occurred in seven cases, i.e. 4 per cent of the material, with loss of function only of the superior branch. In four of these cases, intentional or unintentional deviation from the accepted operating technique proved to be the cause of nerve injury. In a later series of one-hundred cases, no instance of nerve damage occurred.

Thus, on the basis of both our clinical experi-

Ramisection as an Aid to Dental-Orthopaedic Correction of Mandibular Protrusion Remarks upon Indications and Technique on the basis of Results of a Follow up Study KARL-ERIK HOGEMAN, M D, *The Department of Plastic Surgery, Allmänna Sjukhuset, Malmo, Sweden*

The treatment of mandibular protrusion in the adult through team-work between dental orthopaedics and surgery can lay claim to a century-long tradition following *Hullihen's* publication in 1849 but has not actually been developed until after *World War I* Surgery is here an adjuvant method by mobilization of the mandibular skeleton facilitating an instantaneous *orthopaedic correction of the occlusion.*

Mandibular protrusion is a purely symptomatic diagnosis comprised of several clinical conditions Our definition of the term, derived from a study of one hundred and seventy cases is given as follows

Mandibular protrusion in the clinical sense implies that when the teeth are in contact and the articular condyles are in normal position there is in the sagittal occlusion an inverted horizontal overbite anteriorly and a disfigurement of the facial profile due to the profile forming part of the mandible being protruded beyond the profile outline of the maxilla

When assessing the indications for surgical orthopaedic correction of the individual case the occlusion as well as the facial profile are of main interest whereas the decision as to the most applicable type of surgical mobilization of the jaw is influenced mainly by the profile analysis, demonstrating which jaw is most "responsible for the seeming protrusion of the mandible The evaluation as to the appropriate type of therapy should be rendered by a qualified dental orthopaedist on the basis of a thorough analysis of the indications, comprising the following factors

The clinical type of mandibular protrusion.

The subjective symptoms.

The chances of improving the occlusion and the facial profile.

The age of the patient.

The psychic condition of the patient

Social and financial circumstances

Concerning the first point Table 1 will summarize a survey of clinical types of mandibular

TABLE 1 CLINICAL FORMS OF MANDIBULAR PROTRUSION

Primary (idiopathic) mandibular protrusion

Secondary (symptomatic) mandibular protrusion

A Hereditary and congenital malformations
- a Cleft palate and hare-lip
- b Macroglossia (hemangioma lymphangioma)
- c Achondroplasia (fetal chondrodystrophia)
- d Cleidocranial dysostosis (*Crouzon's disease*)
- e Oxycephaly (craniostosis)
- f Leontiasis ossea (*Virchow*)

B Endocrinopathy
- a Acromegaly
- b Eunuchoid gigantism (hypogonadism)
- c. Cretinism

C Posttraumatic forms
- a Fractures (mandibular maxillary)
- b Scar tissue contracture (chin and neck)
- c. Hypertrophy of the mandibular condyle

D Postinfectious form
Mandibular infection (osteomyelitis)

protrusion. Out of these two conditions are particularly subjected to contradictory opinions as regards surgical-orthopaedic correction, i.e. the relative protrusion of the mandible in cases of operated cleft palate and harelip and the macrognathous lower jaw in acromegaly

Many writers claim that relative protrusion resulting from surgical closure of cleft lip and palate must be corrected prosthetically after orthopaedic widening of the maxilla. This may prove quite valid in some cases but in others a very marked underdevelopment of the maxilla defies such conservative treatment Here surgical-orthopaedic measures are mandatory

Acromegalic mandibular protrusion is considered by most to be contra-indicative to active therapy However in some rare instances characterized by loss of mastication function together with malnutrition or intestinal disorders, even though relapse will occur temporary bite correction by means of orthopaedic surgery can be effected.

Subjective symptoms such as disturbed mastication and speech, gastro-intestinal malfunctioning or psychological maladjustment are considered by us to provide sufficient impetus for initiating corrective treatment Quite often, patients exhibiting only slight mandibular protrusion also complain of inferiority feelings. We in Sweden, in contrast to many abroad, are quite

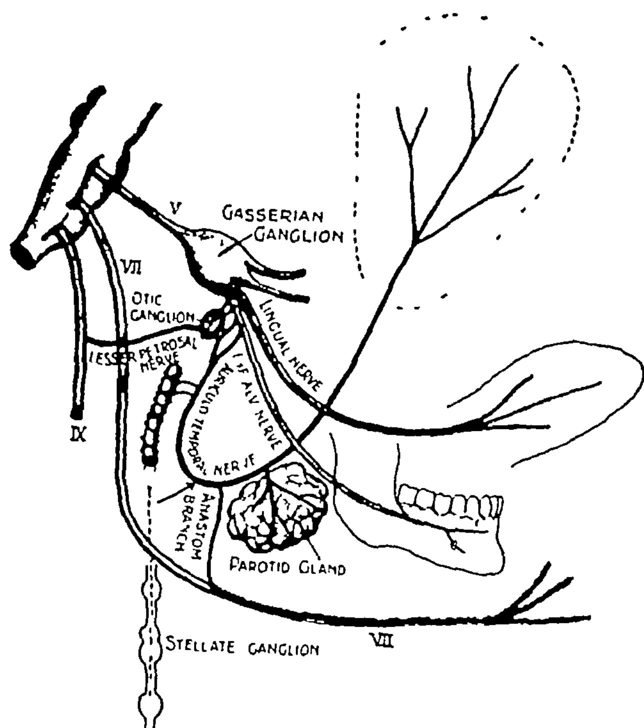


FIG 219 Schematic representation of the auriculotemporal nerve and its connections The arrow indicates the probable site of injury of the nerve at ramisection

Durchtrennung des aufsteigenden Astes als eine Hilfe bei der zahnarztlich—orthopadischen Korrektur der Progenie. KARL-ERIK HOGEMANN

Progenie ist eine rein symptomatische Diagnose, die verschiedenartige klinische Bedingungen umschliesst, die in einer Tabelle zusammengefasst werden Unsere Definition des Ausdrucks wird gegeben. Die Beurteilung der etwa anwendbaren Behandlungsmethode sollte von einem Zahnorthopaden auf der Basis einer sorgfaltigen Analyse gegeben werden, bei der folgende Faktoren zu berucksichtigen sind

1 Die subjektiven symptome

2 Die Moglichkeiten, die Okklusion und das Gesichtsprofil zu verbessern

3 Das Alter des Patienten

4 Der seelische Zustand des Patienten

5 Soziale und finanzielle Lage des Patienten

Jeder der 6 Punkte wird kurz besprochen In Bezug auf die chirurgische Technik wird die Durchschneidung des aufsteigenden Astes gegenuber der Corpusresektion diskutiert Auf der Grundlage unserer Beobachtungen und personlichen Erfahrungen halten wir in der Mehrzahl der Falle die Durchschneidung des aufsteigenden Astes fur die zu bevorzugende Methode, glauben aber, dass die Resektion des Unterkieferkorpers in Fällen von extremer Makrognathie des Unterkiefers und bei Unterkieferprotrusion mit partiellem offenen Biss das logische Vorgehen ist Einige Punkte fur die Anwendung der Ramisektion werden erwahnt, wie die Vermeidung von Beeintrachtigungen des N facialis, des N mandibularis und des N auriculotemporalis In diesem Zusammenhang wird das Auriculontemporal-Syndrom (Frey) als eine Folge der Durchtrennung des aufsteigenden Astes demonstriert

La Sección de la Rama de la Mandíbula Como Una Ayuda en la Corrección Ortopédicadental de la Protusión Mandibular. KARL-ERIK HOGEMAN

La protusión mandibular es un diagnóstico puramente sintomático que comprende varias condiciones clínicas, resumidas en una tabla En el trabajo se da la definición del término La evaluación del tipo apropiado de terapéutica debe darla el ortopedista dental, basandose en un análisis de las indicaciones que comprenden los siguientes factores

El tipo clínico de protusión mandibular

Los síntomas subjetivos

La oportunidad de mejorar la oclusión dentaria y el perfil facial

La edad del paciente

La condición psíquica del mismo

Las condiciones sociales y económicas

Cada uno de los seis puntos se discute brevemente

Se discute la técnica de la sección de la rama enfrentandola a la sección del cuerpo Basandose en nuestro estudio y en la experiencia personal creemos que la sección de la rama debe preferirse en la mayoría de los casos pero la sección en el cuerpo mandibular es el procedimiento lógico en casos de macrognatia extrema con protusión y mordida abierta parcial

Se mencionan algunospuntos de técnia cuando se usa la sección de la rama como son como evitar la interferencia de los nervios facial, mandibular y auriculotemporal Se demuestra que el síndrome auriculotemporal (Frey) es una secuela de la sección de la rama

---

Prosthetic Appliances and Apparatus in Plastic Surgery of the Face and Jaws. KURT HILLERSTROM, Dr dent, Asst Professor, *Royal School of Dentistry, Stockholm, Sweden*

The management of jaw injuries and diseases has shown the same trend, in Sweden, as that in many other countries It was once in the hands of the general surgeon, at first alone and then with the cooperation of dentists, but with World War I came the need of specializing oral surgeons These specialists were in fact dentists with supplementary surgical training With the advent of plastic surgery as a specialty in Sweden, collaboration soon arose between its prac-

ence and follow up studies although we consider *resection of the mandibular body* to be the logical procedure in cases of either pronounced macrognathous mandibular protrusion or partially open bite we believe ramisection to be the preferred method in the majority of cases.

The technique we employ is transverse sectioning by means of a saw through small incisions immediately behind the lobe of the ear General endotracheal anesthesia is used Locating the mandibular notch with a small elevator the bone is cut from 1 to 1.5 centimeters below this point Thus, interference with the mandibular nerve and vessels is avoided When cutting the bone profuse bleeding may occur as a result of injuring the posterior facial vein This flow however can be arrested easily by compression *of the wound and the superficial temporal vessels* Attempting to use arterial forceps in this situation risks injury to the facial nerve and must be designated as an error in technique

The final point of interest in ramisection is the possibility of the auriculotemporal syndrome (*Frey*) occurring i.e gustatory evoked sweating and flushing of the temporal region and the cheek (Fig 218) This condition was present in sixteen cases of our follow up series Analysis of these cases proved the syndrome to arise from misdirected regeneration of parotid nerve fibres into those of the sweat and vasodilator fibres of the auriculotemporal nerve as a result of operative injury to the nerve (Fig. 219) Resection of the auriculotemporal nerve is indicated in such cases and has been performed by us in three instances with complete success.



FIG. 218 Auriculotemporal syndrome appearing 4 months after ramisection and constantly evoked by gustatory stimulation during 13 years. The extent of the gustatory sweating area registered with *Minor's* test.

REFERENCE

1 Hogeman, K. E. Surgical-orthopaedic correction of mandibular protrusion. Acta Chir Scand., Supplementum 159 Stockholm 1951

La Section de la Branche Montante du Maxillaire Comme Moyen d Appoint a la Correction Dento-Orthopédique de la Protrusion Mandibulaire. KARL-ERIK HOGEMAN

La protrusion mandibulaire constitue un diagnostic purement symptomatique qui englobe de nombreuses conditions cliniques résumées dans une table L'auteur donne la définition du terme qu il emploie. C'est un orthopédiste dentaire qui doit apprécier quelle est la thérapeutique convenable en se basant sur une analyse correcte des indications et en tenant compte desfacteurs suivants

Le type clinique de la protrusion mandibulaire

Les symptômes subjectifs

Les chances d améliorer l articulé et le profil dumalade

L'âge du malade

L état psychique du malade

Les conditions sociales et financières.

Chacun de ses points est brièvement discuté.

En ce qui concerne la technique chirurgicale on discute des avantages de la section de la branche montante opposée à la résection du corps du maxillaire. En se basant sur les études faites sur ce sujet et sur son expérience personnelle, l auteur pense que la section de la branche montante doit être la méthode préférée dans la majorité des cas mais estime que la résection du corps de la mandibule doit être le procédé logique dans des cas de protrusion mandibulaire chez des sujets extrêmement macrognathes et dans les cas de protrusion du maxillaire inférieur avec béance partielle de l articulé

On précise quelques points des techniques dans les cas de section de la branche montante et notamment comment éviter de tomber sur les nerfs facial, mandibulaire et ariculo-temporal A ce propos on présente en tant que séquelle de la section de la branche montante le syndrome ariculo-temporal de Frey

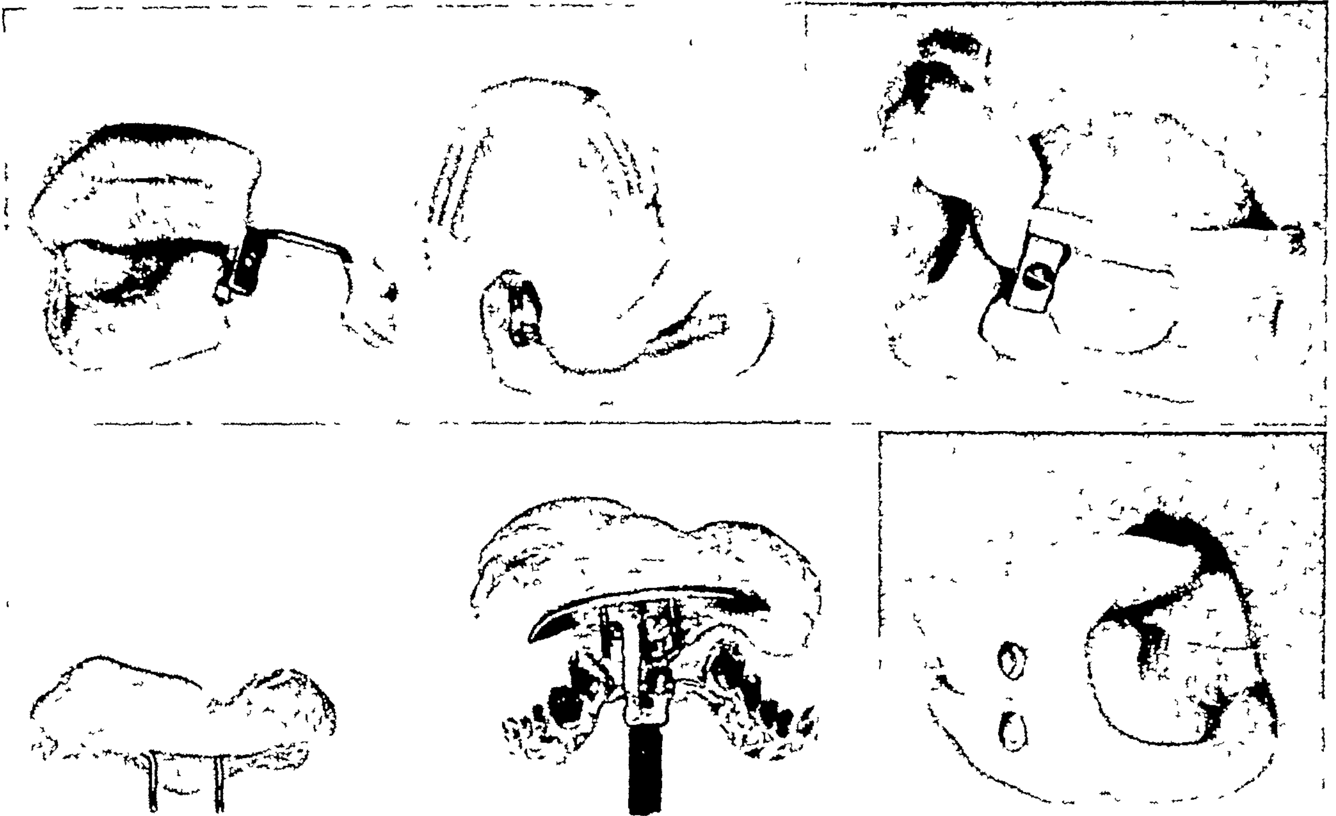


FIG 221 (top left) Buccal inlay appliances for a case of scar-tissue contraction following radiotherapy of oral carcinoma The patient, an edentulous woman, had a very limited mouth opening, and the splints therefore had to be made in three sections The photograph shows the upper and lower splints and the intervening retention rim in which the device for fixing the removable moulds is fitted (Top right) The same appliances assembled (Bottom left) Appliances for labial inlay in case of cleft lip and palate with excised premaxilla Here the mould holder is fitted to a cast cap splint, to the right is the removable mould of Kerr's impression compound and to the left the acrylic one, originally moulded from the former, as it appeared at the end of treatment (Bottom right) Splints for protecting pedicle tube to the palate

stance, the treatment of such fractures of the jaw (the majority) that do not require surgical measures

The jaw prosthodontist's field of *work* is as follows (1) Treating, either independently or together with plastic surgeons and dental orthopedists, fractures of the facial bones and jaws (2) Making supporting appliances for plastic repair of soft tissues, e g, buccal and nasal inlays (3) Planning the treatment of, and making appliances for, anomalies of the maxillo-mandibular relationship (4) Treating temporomandibular joint disturbances (5) Making intra- and extra-oral resection prostheses, nasal, ear and ocular prostheses (6) Prosthetic treatment of palatal defects (cleft palate), including bridgework following dental orthopedic treatment

The schools of dentistry have sought to standardize and improve various types of apparatus Since the illustrative material in a paper of this kind has to be strictly limited, only a few examples can be given here

SUMMARY

The general trend of the management of jaw injuries and diseases in Sweden is outlined The development in this field has led to teamwork between plastic surgeons, jaw prosthodontists and dental orthopedists The projected jaw centers are briefly described

The term and concept, *jaw prosthodontics*, is defined with reference to the field of work of the jaw prosthodontist

REFERENCES

1 Ragnell, A, and Hillerstrom, K Plastic and Reconstructive Surgery, 15 22, 1955
2 Hillerstrom, K Svensk Tandlakare-Tidskrift, 42 213, 1949
3 Hillerstrom, K, and Nyquist, G Acta Odontologica Scandinavica, 12 65, 1954

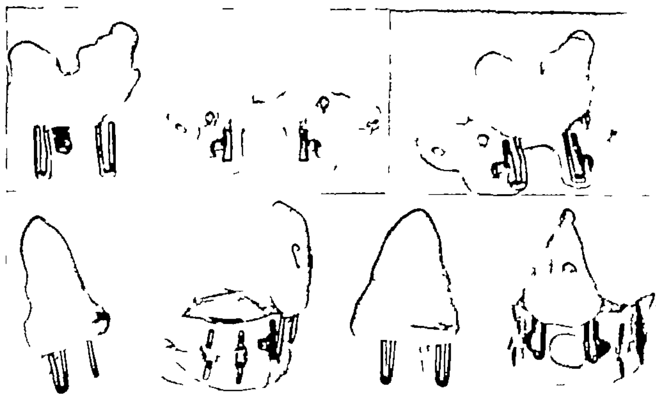


FIG 220 (top left) Appliances for labial inlay in a surgically treated case of congenital defect of lip and palate Edentulous patient with the premaxilla excised The splint is attached by ligatures round the zygomatic arch and over the infraorbital margin. Two identical specimens of the retaining tray are always made each of them being coated with Kerr's impression compound at operation. One of them is used as epithelium carrier the other for moulding an acrylic appliance which replaces the first when the epithelium has "taken" (after 10-12 days) (Top right) The same appliances assembled. (Bottom) Appliances for case of syphilitic saddle nose with desquamated mucosa and attendant ozena. Edentulous patient the splints being attached by alveolar wiring in the maxilla and circumferential wiring in the mandible During the period of about three months in which the removable mould is worn it is trimmed down as required.

titioners and certain prosthodontists and it is this development which the writer is seeking to promote and wishes to outline in this paper

In virtually every field of experimental technical and clinical research and practice today teamwork is the keynote the individual worker is not capable of the advanced specialization required in several different fields In the management of jaw and midface cases a team consisting of a plastic surgeon a dental orthopedist and a jaw prosthodontist should, in my view ensure better results than could be obtained by an oral surgeon either alone or with temporary specialist help [1]

In Sweden, the medical authorities are planning to establish six jaw centers, each of which will serve a population of about one million These centers will adjoin plastic surgery departments and existing and projected schools of dentistry Attached to them will naturally be other specialists such as roentgenologists, dental surgeons speech and hearing therapists otorhinolaryngologists etc.

I have used the designation *jaw prosthodontics* but since the term is a new one it requires definition. The basic training of the jaw prosthodontist is that of the dental prosthodontist he must thoroughly understand the *materials and their technical use*, the function of the jaws including articulation and occlusion, and he must have esthetic sense. He will find considerable use for mechanical ability and ingenuity The qualifying word *jaw* rather than *dental* is used because the scope of this work has been extended to the jaws and face. In my opinion the term *surgical prosthetics*—sometimes called in Germany *Chirurgische Prothese*—is inadequate since the prosthodontist as such does not perform surgery and in any case he does much of his work quite independently for in-

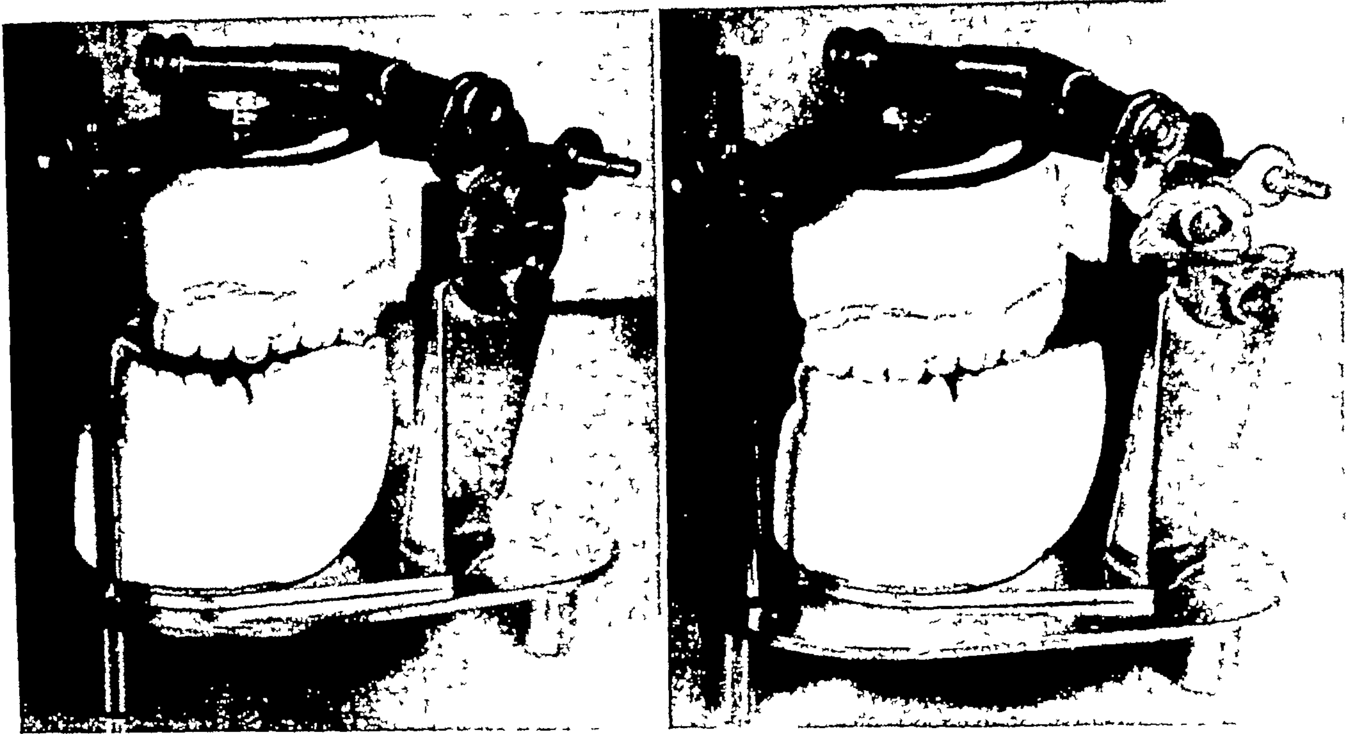


Fig 223 For the planning of operative treatment of mandibular protrusion, a special analyzer has been designed In the photograph to the left, models are mounted in the instrument for analysis, to the right, they are in the position planned The direction of osteotomy and shifts in all directions can be read in millimeters

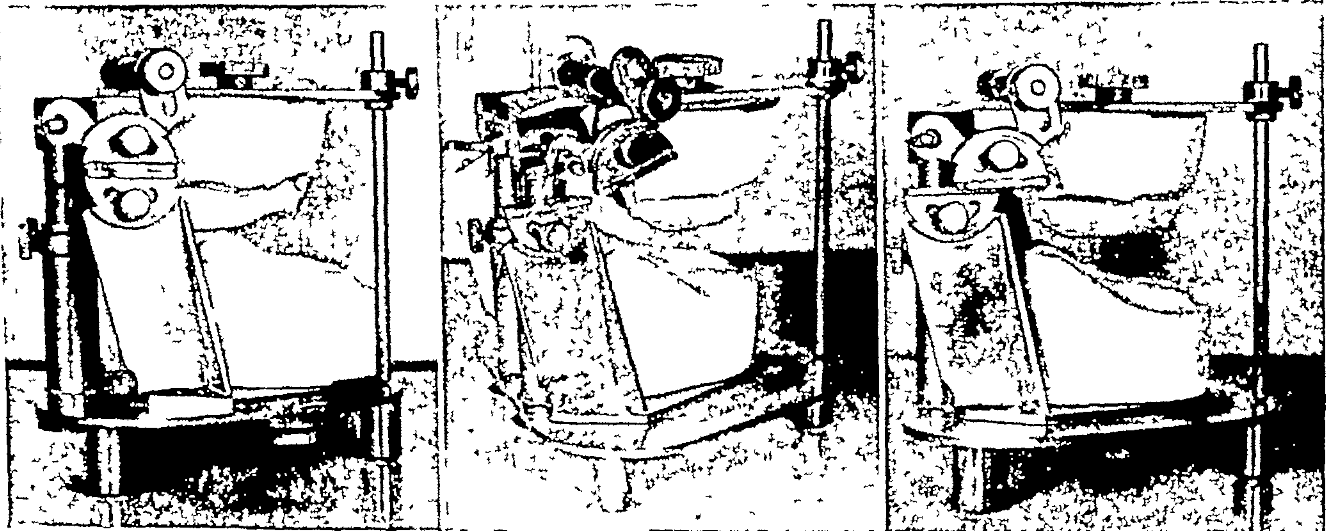


Fig 224 (left) Models of edentulous case mounted in the analyzer with the instrument set at zero Middle Same models adjusted to the optimal crest relationship, which shows that bone contact cannot be obtained if the mandible is retroposed so much (Right) Showing the models adjusted to an acceptable maxillo-mandibular relationship The osteotomy indicator shows the bone contact after operation

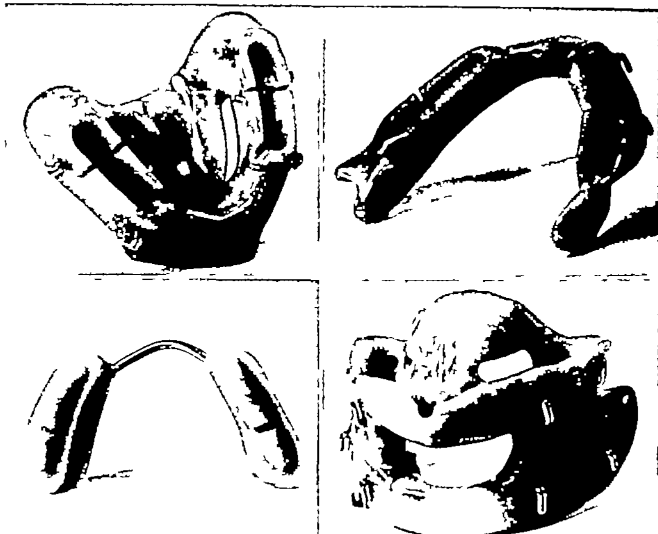


FIG 222 Splints of this design are used in correction of mandibular protrusion in edentulous cases.[2] The operation is done in two stages the upper and lower splints (top left and right) are fixed, under local anesthesia by means of alveolar and circumferential wiring respectively and when any local reactions (edema hematoma) have subsided osteotomy of the ascending rami is performed under general anesthesia. After section of the rami the middle piece (bottom left) is inserted and keeps the jaws in the position planned.

Les Appareils de Prothèse dans la Chirurgie Plastique de la Face et des Maxillaires. KURT HILLERSTRÖM

L'auteur décrit la tendance générale du traitement des traumatismes et infections mandibulaires en Suède Dans ce domaine on en est arrivé à un travail par équipe comprenant des chirurgiens esthétiques, des prosthodontistes maxillaires et des orthopédistes dentaires On décrit brièvement les centres maxillaires projetés

On définit le terme et la conception que l'on doit avoir des *prosthodontistes maxillaires* et les limites de sa compétence

Prothetische Apparate in der plastischen Chirurgie des Gesichts und der Kiefer KURT HILLERSTRÖM.

Die allgemeinen Richtlinien für die Behandlung von Kieferverletzungen und krankheiten in Schweden werden umrissen. Die Entwicklung auf diesem Gebiet hat zu einer Zusammenarbeit zwischen plastischen Chirurgen Kieferprothetikern und Zahnärztlichen Orthopäden geführt. Die in Aussicht genommenen Kieferzentren werden kurz beschrieben. *Der Ausdruck und Begriff Kieferprothetik* wird in Hinblick auf das Arbeitsgebiet des Kieferprothetikers definiert

Instrumentos y Aparatos Protésicos en Cirugía Plástica de la cara y mandíbulas. KURT HILLERSTRÖM

Se delinea la tendencia general en el manejo de las lesiones y enfermedades de las mandíbulas. El desarrollo en este campo ha sido dirigido por el *team formado por el cirujano plástico el prostodoncista* de mandíbula y el ortopedista dental. Se describen brevemente los centros proyectados para la atención de las lesiones de mandíbula.

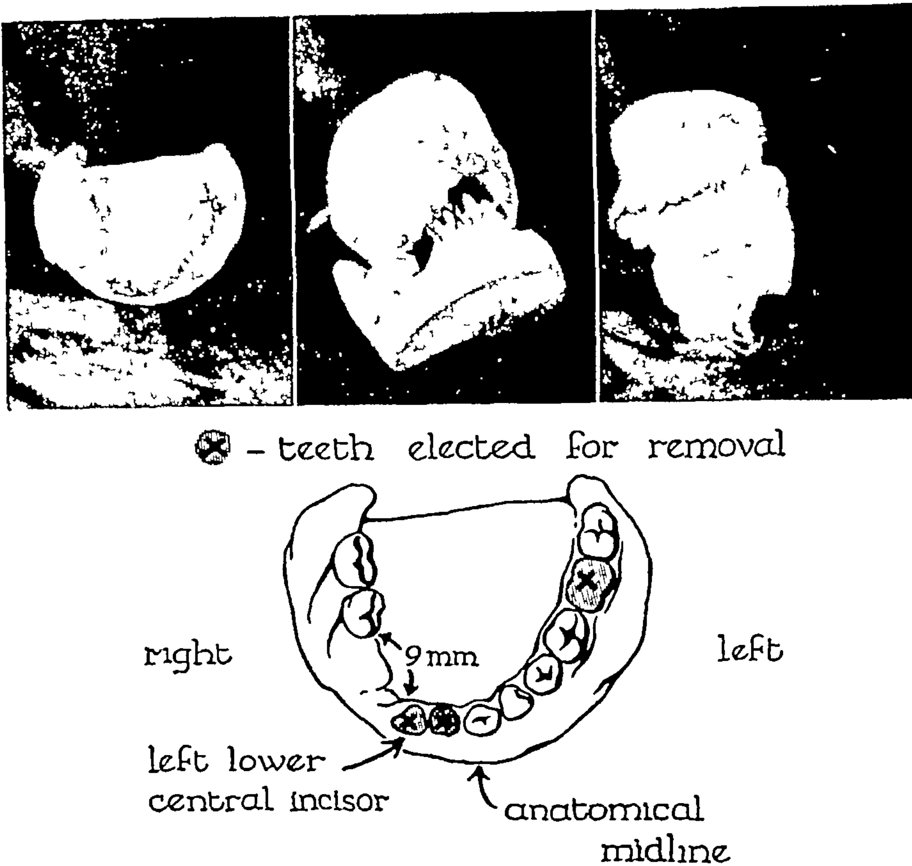


FIG 226 Dental Stone Models of pre-operative position of the mandibular teeth, (the teeth (X) elected for discard), the shape of the mandibular arch, the occlusion and under bite *before* sectioning (Upper left) *Dental stone model of mandible before sectioning* The left central and lateral canine teeth (marked X) elected for removal because their position and lack of contact renders them functionless in the new-planned occlusion Second left lower molar (marked X) elected for sacrifice because of choice of site of section of left side of body of the mandible

The lower picture shows more clearly the pre-operative position Note (1) Shape of mandibular arch (2) Space between left lower central incisor and right lower first molar which normally has a complement of 5 teeth reduced to 9 mm (3) The only teeth present in the right side of the body of the mandible are the first and second molars They are tipped so greatly from bone destruction resulting from the original disease that their occlusal surfaces are pointing lingually (4) The only tooth left for anchor in the posterior fragment of the left side of the body of the mandible after sectioning, will be the left lower third molar (Upper center) *Oblique view from below* before sectioning, showing the poor occlusion, the left lower central and lateral incisors marked X for sacrifice, and the space for the absent 5 teeth narrowed to 9 mm (Upper right) *Profile view of pre-operative dental models* properly mounted on the articulator to show the marked under-bite

(b) The lower model is then cut, increased in size, and unusable teeth are marked for sacrifice, re-positioned in relation to the upper on an articulator, with a view of correcting the facial deformity, and at the same time producing a functional occlusion (Figs 226-228) The sections of the lower model can then be joined with a little fresh plaster in the "new" position It is by this means that the decision which teeth, if any, must be sacrificed, and the best location for bi-lateral sectioning of the mandible, can be determined

B *The method of fixation of mandibular fragments*

(a) Three sectioned German silver cap cast splints were constructed, and prefabricated "lock bars" made to hold the bi-laterally sectioned mandible in its "new" position The "lock bars" are fixed to each section of the splint by means of single screws and "locking devices," † so that the sections of the mandible can be *locked into their predetermined position*

† Down Bros & Mayer & Phelps Ltd, London and Toronto



Fig 225 Models in a case of mandibular protrusion From left to right before during and after operation. In cases with teeth the jaws are held in position by means of silver cap splints cemented to the teeth

El término y concepto de prostodoncista de mandíbula se define, con referencia al campo de trabajo en el cual interviene

---

Mandibular Deformity Resulting from Osteomyelitis in Infancy J WALLACE McNICHOL,* M D, M S (Tor) F R. C S** (C) A T ROGER*** D D S-Major R. C D C, *418 Medical Arts Building, Hamilton, Ontario, Canada*

The method about to be described is a corollary of our method of "An Original Method of Correction of Hyperplastic Asymmetry of the Mandible" published in Plastic and Reconstructive Surgery 1 288 1946

In the 1946 publication we described the deduction of normal bone in the mandible as a result of hyperplastic development by means of prefabricated multi-sectioned German silver cap cast splints designed and planned on plaster models which were then sectioned on an articulator for the most ideal post-operative occlusion, for which prefabricated lock bars were then made The deformity was then corrected by

1 First stage—bi-lateral full thickness resection of the body of the mandible with removal of certain teeth. (See original article.)

2 Second stage—bi-lateral cancellous bone grafts tho the body of the mandible through extra-oral approach

3 Third stage—further bone "sculpture" as indicated (see original article for detail)

4. Fourth stage—soft tissue reconstruction by fat fascial dermal graft as a result of underlying bony deformity

5 Fifth stage—further similar soft tissue reconstruction (see original article for further details)

The present publication describes the problem of the addition of bone to correct a gross deformity of the body of the mandible, as a result of major destruction of normal bone in early childhood due to acute osteomyelitic disease (the space normally occupied by the complement of five teeth—32 mm—was reduced to 9 mm) The pre-operative plan and the reconstruction consisted of five procedures over a period of 9½ months

The Pre-Operative Plan

A *The method of devising a new functional occlusion in a hypoplastic mandible*

This method is similar to the method originally described. In summary the following are the steps in determining the possibilities of bite adjustment

(a) Obtain plaster models of the dental arches and record on them the existing occlusion (Fig 226)

* Chief of Plastic Surgery—Hamilton General Hospital, and St. Joseph's Hospital Hamilton Ontario Canada.

** Fellowship of the Royal College of Surgeons of Canada in Surgery modified for Plastic Surgery

*** Instructor in Dental Oral Surgery—R. C D C School Ottawa, Ontario Canada.



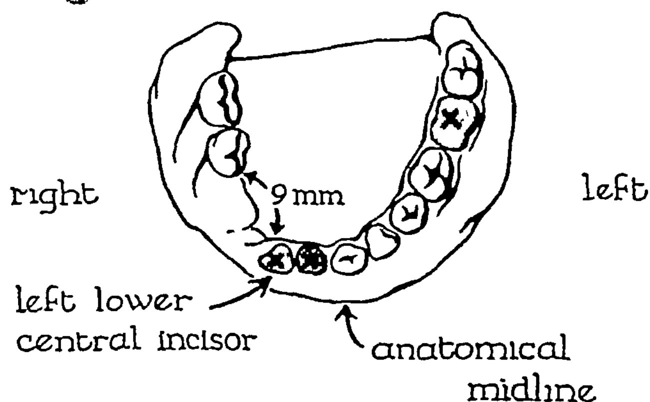


Fig 226 Dental Stone Models of pre-operative position of the mandibular teeth, (the teeth (X) elected for discard), the shape of the mandibular arch, the occlusion and under bite *before* sectioning (Upper left) *Dental stone model of mandible before sectioning* The left central and lateral canine teeth (marked X) elected for removal because their position and lack of contact renders them functionless in the new-planned occlusion Second left lower molar (marked X) elected for sacrifice because of choice of site of section of left side of body of the mandible

The lower picture shows more clearly the pre-operative position Note (1) Shape of mandibular arch (2) Space between left lower central incisor and right lower first molar which normally has a complement of 5 teeth reduced to 9 mm (3) The only teeth present in the right side of the body of the mandible are the first and second molars They are tipped so greatly from bone destruction resulting from the original disease that their occlusal surfaces are pointing lingually (4) The only tooth left for anchor in the posterior fragment of the left side of the body of the mandible after sectioning, will be the left lower third molar (Upper center) *Oblique view from below* before sectioning, showing the poor occlusion, the left lower central and lateral incisors marked X for sacrifice, and the space for the absent 5 teeth narrowed to 9 mm (Upper right) *Profile view of pre-operative dental models* properly mounted on the articulator to show the marked under-bite

(b) The lower model is then cut, increased in size, and unusable teeth are marked for sacrifice, re-positioned in relation to the upper on an articulator, with a view of correcting the facial deformity, and at the same time producing a functional occlusion (Figs 226-228) The sections of the lower model can then be joined with a little fresh plaster in the "new" position It is by this means that the decision which teeth, if any, must be sacrificed, and the best location for bi-lateral sectioning of the mandible, can be determined

B *The method of fixation of mandibular fragments*

(a) Three sectioned German silver cap cast splints were constructed, and prefabricated "lock bars" made to hold the bi-laterally sectioned mandible in its "new" position The "lock bars" are fixed to each section of the splint by means of single screws and "locking devices," † so that the sections of the mandible can be *locked into their predetermined position*

† Down Bros & Mayer & Phelps Ltd, London and Toronto

during the first stage operation. Provision should be made for inter maxillary fixation to give greater stability after bi-lateral sectioning by placing hooks for wires or additional locks on the splints (Figs 227 and 228)

(b) The cap cast splints were then cemented into position and the "lock bars" held in abeyance to be used at the time of the first stage operation which consisted of bi-lateral mandibular sectioning

METHOD OF CORRECTION

Prior to the first stage Dr Roger extracted the partially carious lower left second molar through which the left mandibular section was to be made also the left lateral and central incisors as they were markedly separated from each other and lay on an inferior plane and could not be used in the new occlusion

First stage—bi-lateral complete section of the



FIG 227 Dental models with sectional cast cap splints *in situ* and after sectioning, with prefabricated "lock bars having locked the intermediate section of the mandible into its "new" predetermined position. (Left) *view from above* showing the three sectional cast cap splint *in situ* with the space on the right side having been increased from 9 mm to 32 mm and the long "lock bar" shown maintaining same The left side was brought forward 8 mm at the site of the extracted second lower left molar tooth and the short lock bar" shown maintaining same (Center) *Right profile* showing above characteristics. The intermediate fragment was also dropped inferiorly as there was originally marked shortening of the lower third of the face (Right) *The left profile*—Note the single tooth maintaining splint on the left posterior fragment This is NOT ideal but can be accomplished if well made and fitted



FIG. 228 Dental models with sectional cast cap splints *in situ* and after sectioning, shown on the articulator in the "new occlusion (Left) *A P view*—clearly showing the 32 mm space on the right side with its "locking bar in place Note the left side of the symphysis of the body of the mandible is now in its *normal* position having been rotated from an extreme position on the right of the mid-line (Center) *Right profile*—showing the right 32 mm space the locking bar' *in situ* and the intermediate fragment having been dropped inferiorly as well as brought forward to decrease the shortening of the lower third of the face (Right) *Left profile*—showing left 8 mm space the short "lock bar" and the single tooth which is practical but not ideal on the left posterior fragment. The left mandibular nerve was maintained in continuity

mandible at previously planned points, with rotation of intermediate mobile fragment into new occlusion, which was brought forward *32 mm* on the right side and *8 mm* on the left The *right* mandibular nerve had been destroyed at the point of acute osteomyelitic diseases The *left* mandibular nerve was *intact* and in spite of the necessity of bringing the mandible 8 mm forward on the left side, this was accomplished by freeing the left mandibular nerve in its canal and "teasing" it out to get 8 mm of additional length The left lower teeth anterior to the section have remained viable together with sensation to the left lower lip The intermediate fragment was also dropped inferiorly, as there was marked shortening of the lower third of the face, i e between nose and chin This new position of the intermediate section of the mandible was easily arrived at by bolting the prefabricated lock bars into position (Fig 229)

Second stage—35 days later—cancellous bilateral bone grafts (ilium) were inserted to the body of the mandible at the sites of the previous sections

Right side—cortical cancellous bone graft was used and mortised as an arrow head into the cortex of the mandible across the 32 mm defect with a flexible shaft electric saw The graft was held in place by 38 gauge S S interosseous wire

Left side—the fresh scar was carefully excised about the intact left mandibular nerve, and the bone ends freshened Cancellous bone was packed above, below and external to the nerve and a thin sheet of cancellous bone was placed on the superficial surface of the mandible The bone grafting was deferred to this stage to eliminate the undesirability of mouth contamination

Third stage—2½ months later—deepening of the inferior buccal sulcus on the right side of the mid line (at the site of old original osteomyelitic process) by 180° local rotation mucous membrane flap



Fig 229 First stage, showing cast cap splints in situ and intermaxillary wires aiding in stabilizing the mandible

Fourth stage—3 months later—Z plasty to further deepen inferior buccal sulcus as the previous mucous membrane pedicle flap lacked 1 cm in length for complete correction

Fifth stage—3 months later—this consisted of a *revision of the right old submandibular scar, reduction of the prominence of the "right point" of the chin* by removal of the remainder of the right mental tuberosity and the very thick well developed right mentalis muscle The latter was also responsible for the very deepened abnormal transverse crease between the lower lip and the chin The excision of the right mentalis muscle decreased considerably the depth of the transverse crease between the lower lip and the chin The remainder was corrected by sheet dermal graft from the abdominal wall, held in position by through and through #40 gauge S S wires at the corners

There may be cases in which the inferior buccal sulcus does not need reconstruction, there may be no undue external scarring requiring revision, therefore, in this type of cases, the reconstruction would consist of only *two* stages

Case Report

K B—age 24—first seen April 3rd, 1947

History

Patient developed a severe acute infection of the umbilicus shortly after birth At the age of 6 weeks, developed acute osteomyelitis in the right side of the body of the mandible and the right calcaneum Patient became very ill and nearly died Above areas both opened and drained At the age of 8 years, patient had a bone graft to the right side of the body of the mandible, by Dr Fulton Risdon He has had no further osteomyelitic disease At the age of 10, developed a spontaneous abscess in the left thigh, which may or may not have been related to the original acute osteomyelitic disease, as the etiology of the abscess was never established The patient has had no further evidence of acute infection, and has had no treatment of his mandibular deformity, during the past 16 years, when he presented himself for further treatment (Fig 230)

It is of great psychological significance that

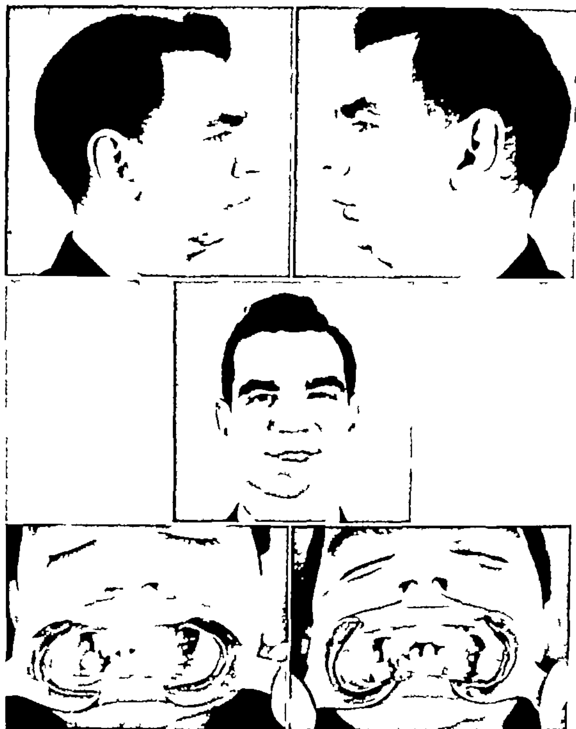


FIG. 230 Pre-operative views K B Age 24 History of acute osteomyelitis of the right side of the body of the mandible and right calcaneum at 6 weeks of age resulting from severe acute umbilical infection. See Fig. 226 legends for details of occlusion. (Top left) Right profile (Top right) Left profile (Center) Full Face (Bottom left) A P occlusion view (Bottom right) Oblique view from below of occlusion—See Fig 226 legends for details of occlusion

the patient states the following "when I was young both my parents being teachers it was hoped that their son would follow them. Later my father who was principal of a high school decided against such a vocation for me He suggested this to me because he felt my facial disfigurement would be a great handicap to me working with children. I started in medicine, and one of the reasons for my deciding not to continue was my facial disfigurement.

It is now 5½ years since the patient was last operated upon. The psychological benefit has

been dramatic, beginning immediately after the first operation He has since married one of the nurses who took care of him, and is successfully established as a chiropodist

General Examination

Normal well developed adult male

Special Examination

Facial features with marked asymmetry and scarring about right side of the body of the mandible as in original photos

The occlusion was exceedingly abnormal with absence of five teeth from the right central incisor to the right first molar, due to destruction of the permanent tooth buds due to the original acute osteomyelitic disease The space for this complement of 5 teeth being reduced to 9 mm The *cross bite* was so extreme that the *left lower central incisor occluded with the upper right second premolar* The mandible was markedly retruded as shown in photos (Fig 230) The right lower molar teeth were extremely tilted with their occlusal surfaces lingual

Operations

Pre-operative cementing of three sectional German silver cap cast splint and extraction of three teeth (lower left second molar, lower left lateral and central incisors (see discussion under method of correction) was done pre-operatively by Dr Roger

First stage—January 3, 1949 Bi-lateral mandibular section through the body of the mandible with rotation of the intermediate mobile fragment into its new occlusion

Second stage—February 7, 1949—(35 days later) Bi-lateral cancellous cortical bone graft to the body of the mandible Intermaxillary wires were applied at the beginning of the operation after packing was placed around the nasal intratracheal tube, to stabilize the lower jaw against the upper during the bone grafting procedure, to take excess strain off of the left third section of the splint which was on only one tooth (3rd molar, left) At the end of the operation, these wires were cut, packing about the intratracheal tube removed, hypopharynx sucked out, tube withdrawn, and the intermaxillary wires re-applied The intermaxillary wires were left on 6 weeks post-operatively to give added support to the cap cast splints, the splints were not removed for an additional 3 months (See X-rays, Fig 231) X-rays taken June 25th 1949 (4½ months post-operative) demonstrate radiographic evidence of definite bony union bi-laterally

Third stage—April 30, 1949—(2½ months later) Deepening of inferior buccal sulcus on

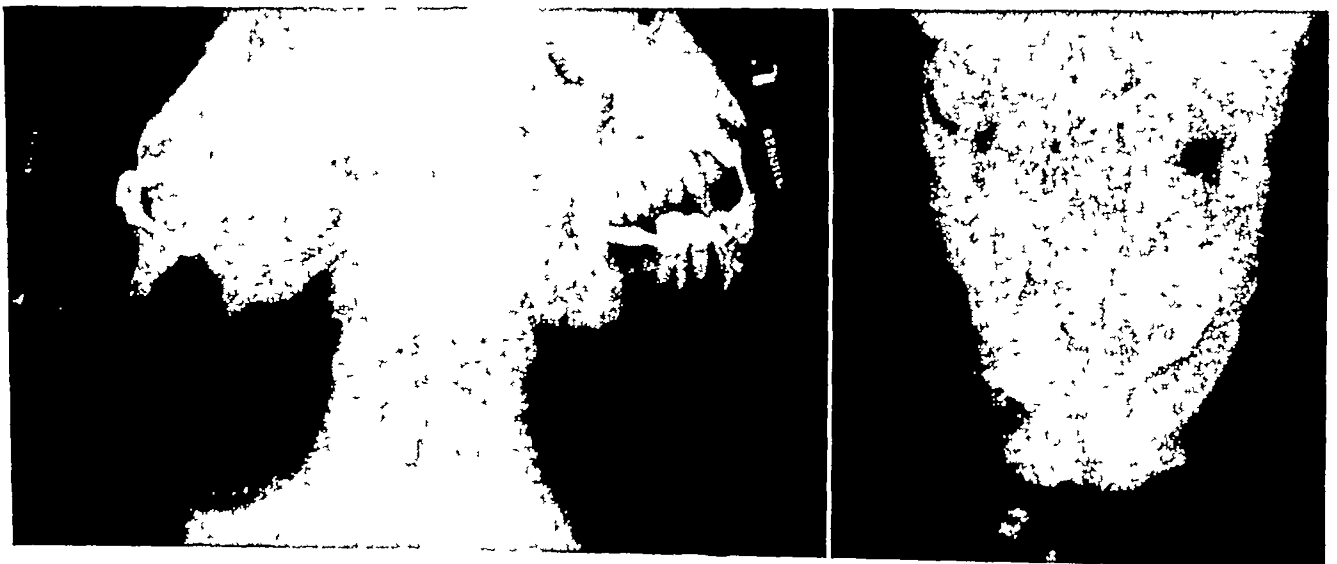


Fig 231 *Early post-operative X-rays 4½ months p o* (Left) *Right oblique*—Showing 32 mm gap filled by both a block of cortical cancellous bone mortised into position, packed and contoured with cancellous chips and held with figure of eight 38 gauge s.s interosseous wire (Center) *Left oblique*—The mandibular nerve was left intact Cancellous bone was loosely packed above, below and external to the mandibular nerve A thin sheet of cortical bone was superimposed on the surface (Right) *A.P* shows relation of bi-lateral grafts

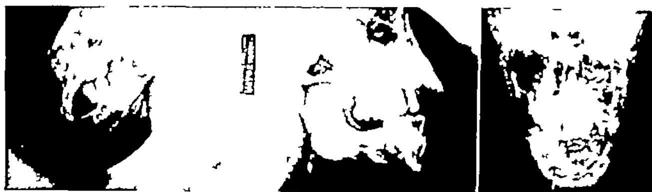


FIG 232 Later post-operative X-rays—6 years 3 months p.o (Left) Right oblique—same view as Fig 231 left (Center) Left oblique—same view as Fig. 231 center (Right) A.P shows relation of bi-lateral grafts.

the right side from mid-line to right molar region by 180 rotation mucous membrane flap This sulcus had been destroyed as a result of the acute osteomyelitis and there was not sufficient room for the planned partial denture without the danger of displacement from movement of the lower lip

Fourth stage—July 15th 1949—(3 months later) Z plasty inferior buccal sulcus The operator was unable to obtain a mucous membrane flap of sufficient length previously to complete the new sulcus It had been rotated 180 and was 1 cm short

Fifth stage—October 28th 1949—(3 months later) Revision of right submandibular scar underlying mandibular prominence and correction of transverse crease between lower lip and chin by excision of right mentalis muscle and application of dermal graft. Patient s progress has been uneventful and very pleasing to both the patient and ourselves (Final X rays—May 25th, 1955—Fig 232 and Final photos March 23rd, 1955—Fig 233 and Fig 234—approximately 4½ years after reconstruction.)

SUMMARY AND CONCLUSION

1 A method of correcting a complicated problem of hypoplastic asymmetry of the mandible as a result of acute osteomyelitis at 6 weeks of age has been presented.

2 The importance of working out a new balanced occlusion the prefabrication of cap cast German silver splints, with pre-calculated "lock bars" *before* any operative interference has been stressed.

3 The psychotherapeutic value in this case has been dramatically illustrated in this patient s "New Life" since his reconstruction

4 The value of combined team work on such a problem is clearly demonstrated.

The authors would like to thank Mrs Anne Donaldson Mr Joseph Bochsler for their reproduction of these photographs and to Miss Sylvia Cranston for her work in the preparation of this manuscript

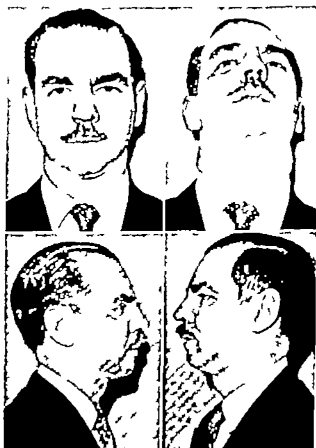


FIG 233 Final views—approximately 4½ years p.o (Top left) Full face with reasonable degree of symmetry having been achieved (Top right) Oblique from below (Bottom left) Right profile. (Bottom right) Left profile Note normal prominence of chin and new vertical length of lower third of the face

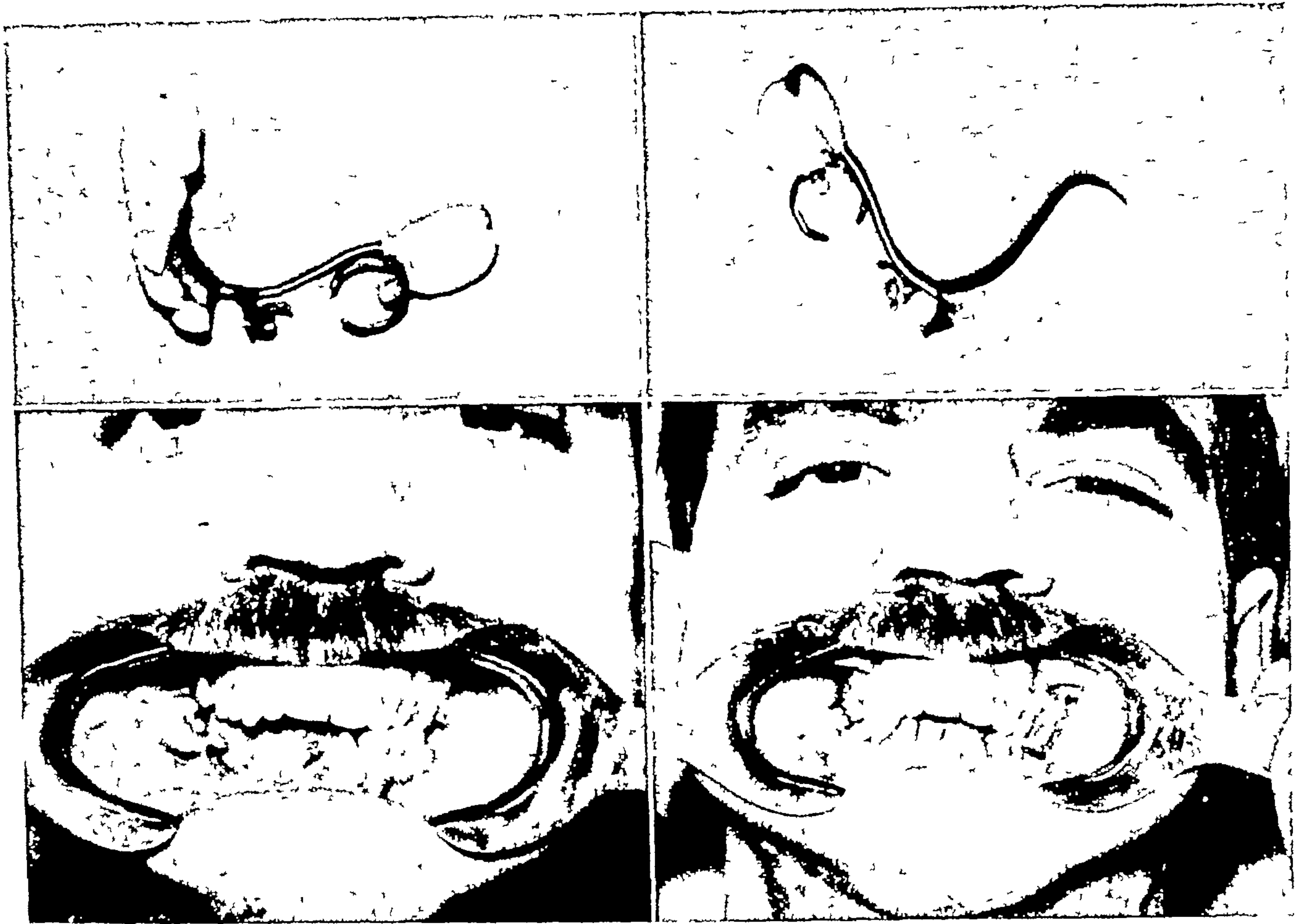


FIG 234 *Partial denture and final occlusion 4½ years post-op* (Top left) Partial denture-occlusal surface (Top right) Partial denture-gingival surface (Bottom left) Final occlusion without partial denture (Bottom right) Final occlusion with partial denture

Déformation de la Mandibule Due a une Ostéomyélite au Cours du Jeune Age. J WALLACE McNICHOL ET A T ROGER

1 Présentation d'une méthode visant à la correction du problème compliqué posé par une asymétrie de la mandibule consécutive à une ostéomyélite aigue à l'âge de six semaines

2 On insiste sur l'importance de recréer un nouvel articulé équilibré, sur la préfabrication d'appareils en argent pour encapuchonnement avec des "barres de verrouillage" précalculées avant toute intervention opératoire

3 Ce cas a fait ressortir d'une façon dramatique la valeur psychothérapeutique d'une telle intervention puisque le malade parle d'une "vie nouvelle" depuis la reconstruction

4 La valeur du travail d'équipe quand on a affaire à un tel probleme est nettement mise en évidence

Unterkieferdeformierung als Ergebnis von Osteomyelitis in der Kindheit. J WALLACE McNICHOL UND A T ROGER

1 Es wurde eine Methode fur die Korrektur einer hypoplastischen Asymmetrie des Unterkiefers als Folgeerscheinung einer akuten Osteomyelitis in der 6 Lebenswoche vorgestellt

2 Die Wichtigkeit, eine neue gut ausgeglichene Okklusion zu erzielen, die vorangehende Anfertigung der deutschen Kappen-Gusschiene aus Silber mit im voraus berechneten Verschlussriegeln (bevor noch irgendeine Operation vorgenommen ist) wurde betont

3 Der psychotherapeutische Wert wurde in diesem Fall durch das "neue Leben" des Patienten nach der Wiederherstellung dramatisch illustriert

4 Der Wert des "Team work" in einem derartigen Problem wird deutlich demonstriert

Deformidad Mandibular Resultante de Osteomielitis en la Infancia. J WALLACE McNICHOL Y A T ROGER

1 Se presenta un método para corregir un problema complejo de asimetría hipoplásica de la mandíbula como resultado de una osteomielitis aguda que se presento a las 6 semanas de edad

2 Se señala la importancia de obtener una nueva oclusión balanceada la fabricación previa de férulas de cúpula de plata alemana con barras de unión calculadas previamente Antes de que ninguna interferencia operatoria haya sido aufatizada

3 El calor psicoterapeutico de la operación se ilustra dramáticamente en este paciente Halla "nueva vida" despues de la reconstrucción

4. Se demuestra claramente el valór del trabajo combinado en equipo en este problema

---

Are Plastic Operations for Temporomandibular Arthrosis Still Indicated Today?

GERHARD STEINHARDT, Dr med, Professor, *Städt Krankenanstalten, Kieferklinik, Bremen, Germany*

We know the pathology of arthrosis of these joints The cause is known to be the disrelation between the function and the capability of cartilage to resist strain This special joint shows better than any other the difficult inadequate working conditions following destruction Figs 235-239 show the progress of temporomandibular arthrosis covering several stages—separation of fibers vascularisation, ossification, and so on

After the loss of the disc the articular eminence is finally flattened and the glenoid fossa is filled up The now characteristically deformed articular surface is to be looked upon as the *final clinical stage of the temporomandibular arthrosis* Functionally it represents a gliding joint without disc Therefore no modelling arthroplasty of known type should be made

Only if the disc can be preserved in cases of temporomandibular arthrosis it is recommendable to give the condyloid process a smooth and round shape. Otherwise any operation which is required after destruction of the disc must aim to produce a plane and not a curved articular surface according to the changed anatomical and functional conditions. The most important of all these problems is exact adaptation of the bite in accordance with the special joint.

The so called intermediary joint cracking may be caused by all kinds of mechanical joint disturbances Wrong function with cracking may lead to arthrosis On the other hand, however a present arthrosis may produce cracking. Accordingly joint cracking can be both cause and symptom of temporomandibular arthrosis. Up to the present the excision of the disc was the only therapy known.

From the therapeutic point of view three kinds of joint disturbances should be differentiated

1 Unconscious wrong jaw movements They should be avoided by proper instructions.

2. *Malocclusion and loss of vertical dimension* (Fig 240) This should be compensated and close bites should be prevented or opened.

3 Temporomandibular arthrosis proved by X ray

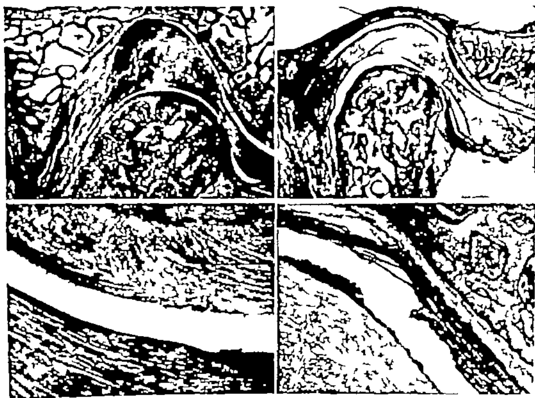


FIG. 235 (left) Male 63 years. (Above) A normal temporomandibular joint. (Below) Enlarged area of the articular eminence (Right) Male 40 years, separation of fibers. (Below) Enlarged.

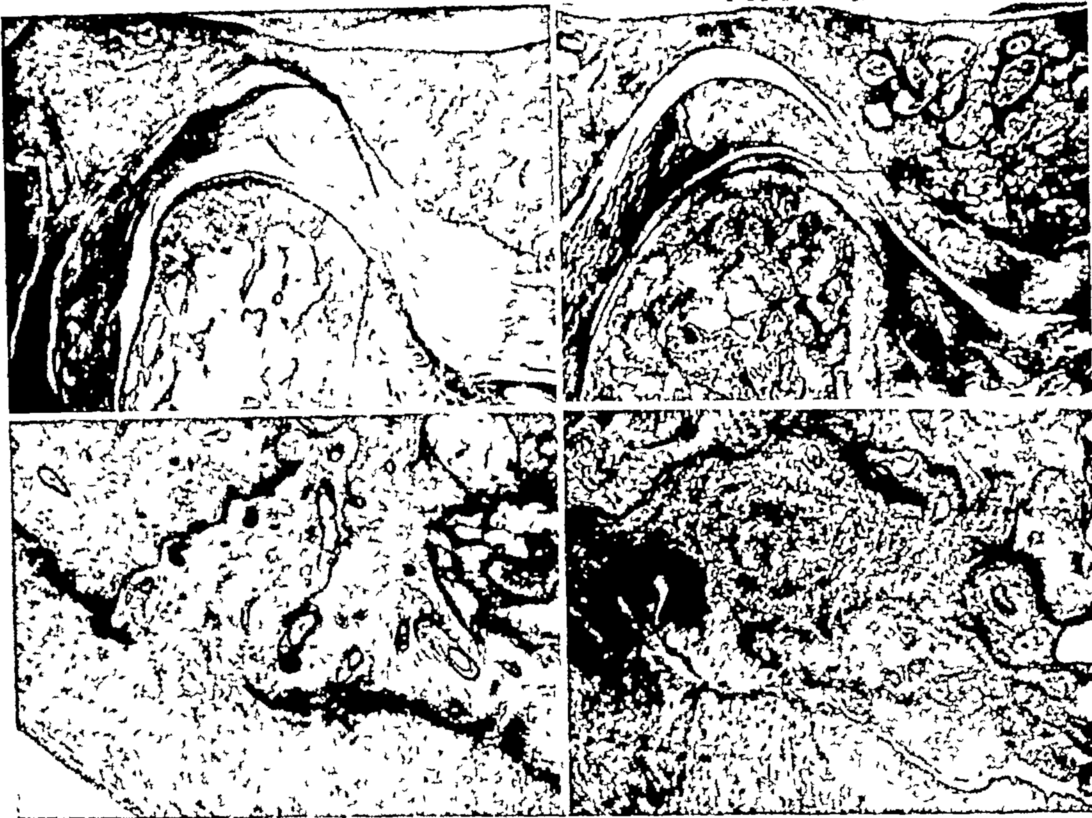


FIG 236 (left) Female 49 years, deep bite medullary space opened arthrosis still early (Right) Male 43 years, destruction with-in the fibrous layer of the articular eminence (Below) enlarged



FIG 237 (left) Female 81 years edentulous, arthrosis with torn disc (Right) Female 63 years edentulous, loss of the disc, smoothing of the articular surfaces

4. *Se demuestra claramente el valór del trabajo* combinado en equipo en este problema

---

Are Plastic Operations for Temporomandibular Arthrosis Still Indicated Today?

GERHARD STEINHARDT Dr med, Professor, *Stadt Krankenanstalten, Kieferklinik, Bremen, Germany*

We know the pathology of arthrosis of these joints. The cause is known to be the disrelation between the function and the capability of cartilage to resist strain. This special joint shows better than any other the difficult inadequate working conditions following destruction Figs 235-239 show the progress of temporomandibular arthrosis covering several stages—separation of fibers vascularisation, ossification and so on

After the loss of the disc the articular eminence is finally flattened and the glenoid fossa is filled up The now characteristically deformed articular surface is to be looked upon as the final clinical stage of the temporomandibular arthrosis Functionally it represents a gliding joint without disc. Therefore no modelling arthroplasty of known type should be made

Only if the disc can be preserved in cases of temporomandibular arthrosis it is recommendable to give the condyloid process a smooth and round shape. Otherwise any operation which is required after destruction of the disc must aim to produce a plane and not a curved articular surface according to the changed anatomical and functional conditions. The most important of all these problems is exact adaptation of the bite in accordance with the special joint.

The so called intermediary joint cracking may be caused by all kinds of mechanical joint disturbances Wrong function with cracking may lead to arthrosis On the other hand however a present arthrosis may produce cracking. Accordingly joint cracking can be both cause and symptom of temporomandibular arthrosis. Up to the present the excision of the disc was the only therapy known.

From the therapeutic point of view three kinds of joint disturbances should be differentiated

1 Unconscious wrong jaw movements. They should be avoided by proper instructions.

2 Malocclusion and loss of vertical dimension (Fig 240) This should be compensated and close bites should be prevented or opened.

3 Temporomandibular arthrosis proved by X ray

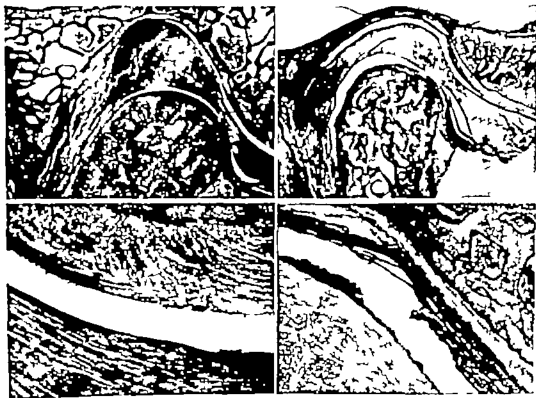


FIG 235 (left) *Male 63 years. (Above) A normal temporomandibular joint. (Below)* Enlarged area of the articular eminence (Right) Male 40 years, separation of fibers. (Below) Enlarged.

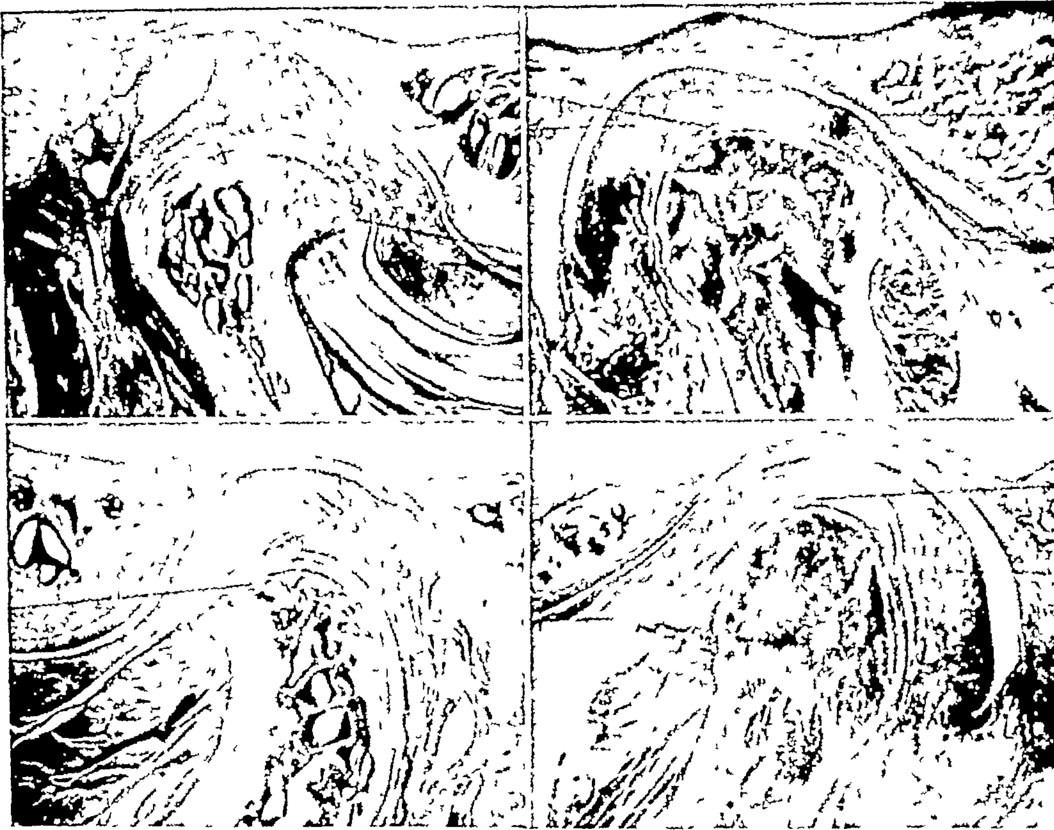


FIG 240 (left) Male 20 years (Right) Male 47 years (Left above) The marginal eminence of the condyloid process has pressed the disc forward (Right) In both joints the disc has been displaced backward by abnormal occlusion



FIG 241 (left) Female 73 years (Right) Male 70 years Complete arthrosis showing all stages of disc damage

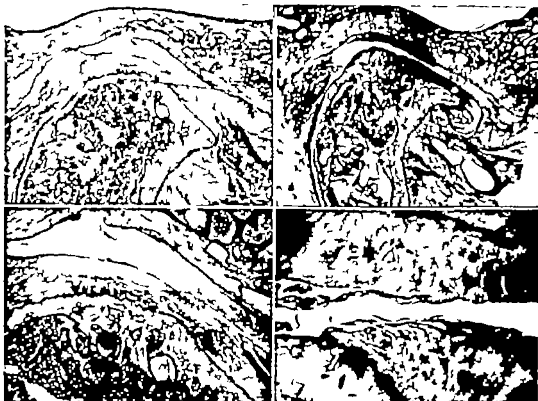


Fig 238 (left) Male 62 years loss of the disc, the glenoid fossa being filled up (Right) Female 68 years the glenoid fossa is here calcified the former sinus curve is flattened.



Fig 239 (left) Female 73 years (Right) Male 60 years (Above) Right joint. (Below) Left joint (Left above) Loss of disc with smoothing of articular surfaces. (Below) Beginning arthrosis. (Right above and below) Gliding joints as a final clinical stage.

in the young and to normal occlusion and temporomandibular function in both the adult and child, provision should always be made for its replacement Our interest was aroused in the problem of finding a suitable substitute for the condyle as a result of our experiments conducted on young Rhesus monkeys, the objective of which was to evaluate a method of treating fracture dislocations of the mandibular condyle[4, 5, 6] Both unilateral and bilateral condylar transections were performed on the monkeys below the attachment of the external pterygoid muscles The condyles were then completely displaced medially out of the joint By means of this surgical procedure, a type of fracture occurring in human beings as a result of trauma to the mandible was simulated in these experimental animals

When the animal condyles were permitted to heal in medially displaced position, malocclusion resulted, and the normal growth of the mandible was interrupted (Fig 242, top) The same dentofacial deformity ensued in all monkeys as would have been expected from a unilateral or bilateral condylectomy, because the growth potential of the mandibular condyle was lost On the other hand, when the condyle was restored to its normal position by open reduction and held there with a Vitallium plate, both the occlusion and the development of the mandible were normal (Fig 242, bottom)

Our initial investigation was expanded to include two other types of experiments, also in young Rhesus monkeys (1) Reconstruction of the temporomandibular joint by means of an autogenous graft containing a growth center (The lateral condyle of the femur and the third metatarsal were used as grafts in this phase) (2) Reconstruction of the temporomandibular joint with a prosthetic implant (Condyles of plastic and Vitallium were used in this portion of the project)

Preliminary results of these two studies, still in progress, are herewith reported

Animal Experiment I Reconstruction of the temporomandibular joint with autogenous grafts from the femur and metatarsal bones —Six monkeys were allotted for this part of the project It was not possible to secure monkeys of a definite age, therefore, weight was the criterion employed to make certain that the animals were young enough to be of value in the investigation Only animals weighing 4 pounds or less were accepted

Grafts from the Femur

The following surgical procedure was carried out for each animal

1 The animal was anesthetized by injecting 90 mg of veterinary nembutal (60 mg per cubic centimeter) into the saphenous vein in the dorsum of the animal's leg

2 An incision was made through the skin and subcutaneous tissues on the lower portion of the left thigh The periosteum was elevated over the distal end of the femur and a saw and chisel were used to remove the lateral condyle The wound was closed with black silk suture

3 A preauricular incision was used to expose the neck of the mandibular condyle The condyle was cut off at the level of the lower limit of the mandibular notch After the graft from the femur was properly shaped, its cartilaginous surface was placed into the glenoid fossa The graft was held in place by means of a vitallium plate and screws

4 Amalgam implants and Vitallium screws served as roentgenographic markers Either amalgam implants or Vitallium screws were placed in the zygomatic process of the temporal bone and in the ramus of the mandible near its union with graft Another incision was made near the angle of the mandible to accommodate another marker near its inferior border

5 Postoperative cephalometric roentgenograms were taken immediately following surgery and repeated at six week intervals in order to follow the outcome of the grafts, markers, plates and screws Cephalometric tracings will be made of these serial roentgenograms and the data correlated with the gross postmortem findings

Comment

The preauricular incision was used to expose the mandibular condyle in all the animals in order to avoid the facial nerve Injury to the facial nerve could cause unilateral paralysis of the facial musculature, which, in turn, might influence development of the bone on that side of the face No evidence of impairment of the facial nerve was observed in any of the animals in this experiment

Only in these cases excision of the disc combined with smoothing of the articular surfaces may be indicated

Summary

Operations are indicated if conservative treatment has failed and troubles are severe However it should be remembered that every operation involves the risk of joint damage which has not yet been mentioned very often in the literature on the subject

References

1 Bomann Acta chir skan., Vol. 95 Supl 118
2 Hankey British dental journ 1954 Nr 10

Les Operations Plastiques de l Arthrite Temporomaxillaire se Trouvent Elles Encore Indiquees de Nos Jours? Gerhard Steinhardt

L auteur montre qu une fois le disque perdue la fosse mandibulaire sera comblée et que la surface articulaire du tubercule articulaire diminuera. La forme préalablement arrondie de cette surface articulaire se transformera en une surface nettement plate

C est pourquoi dans le cas d une opération pour arthrite le condyle (mandibulaire) sera modelé et arrondi uniquement dans le cas de conservation possible du disque

Dans le cas ou on doit procéder à l avulsion du disque on tachera d obtenir une surface articulaire lisse mais plus plate de façon que l articulé dentaire puisse être corrigé en conséquence.

En cas de craquement articulaire, on doit d abord avoir recours à des mesures conservatrices qui ont été décrites. Ce n est que dans le cas d échec de ce traitement qu on interviendra (excision du disque)

Sind Plastische Operationen bei Kiefergelenk Arthrosen heute noch Indiziert? Gerhard Steinhardt

Der Vortragende zeigt dass nach Verlust des Discus die Fossa mandibularis aufgefüllt und die Gelenkfläche des Tuberkulum articulare abgebaut wird.

Aus der ehemals sinusartigen Form dieser Gelenkfläche entsteht so eine einfache Gleitfläche

Deshalb sollte bei Arthrose-Operation -nur bei möglichem Erhalt der Bandscheibe—der Gelenk kopf glatt und rund modelliert werden. Muss der Discus bei der Operation entfernt werden sollte eine glatte aber mehr flache Gelenkfläche angestrebt werden und der Biss entsprechend eingeschliffen werden.

Bei Gelenkknacken müssen erst die im Text geschilderten konservativen Massnahmen ausgeschöpft werden. Erst wenn diese nicht zum Erfolg führen dürfen operative Massnahmen (Discusexcision) vorgenommen werden

Encuentran Indicación Actual las Operaciones de Artrosis Temporo-mandibular? Gerhard Steinhardt

El autor muestra que después de la pérdida del disco la fosa mandibularis se llena y que la superficie articular del tuberculus articularis disminuye. La forma redondeada de la superficie articular se transforma así en una superficie aplanada. Por esa razón en una operación de artrosis la cabeza condílea debe moldearse lisa y redonda sólo si el disco puede preservarse. Si el disco tiene que eliminarse una superficie plana y lisa debe ser el objetivo y la oclusión dentaria debe corregirse de acuerdo con la corrección articular

En crepitación articular debe iniciarse el tratamiento con medidas conservadoras si estas fallan deberá hacerse la excisión del disco

---

Reconstruction of the Temporomandibular Joint in the Rhesus Monkey Clinical Application

Orin H. Stuteville D D S, M D F A C S. and Robert P Lanfranchi, D D S, M S D *The Department of Maxillofacial Surgery, Northwestern University, Chicago, Illinois, U S A*

The mandibular condyle cannot be removed with impunity as several investigators have pointed out.[1, 2, 3] This is true whether the patient is a child or an adult. In the adult, loss of the condyle will alter normal mandibular movements and produce a disturbance in normal functional occlusion of the teeth In the child loss of a condyle is even more serious Whenever this growth center is removed in a child or young adult or whenever condylar growth centers are impaired as a result of trauma or infection, severe dento-facial deformity results at maturity A unilateral early loss of condylar growth is manifested later in life by a pronounced twisting of the chin toward the injured side. Early bilateral loss of condylar growth results in a symmetrical underdevelopment of the mandible, with retrusion of the chin termed "bird face"

There are times when it is necessary in the treatment of human patients to remove the mandibular condyle but inasmuch as the condyle is of such importance to growth of the mandible

* Supported in part by a grant from the United States Public Health Service

in the young and to normal occlusion and temporomandibular function in both the adult and child, provision should always be made for its replacement Our interest was aroused in the problem of finding a suitable substitute for the condyle as a result of our experiments conducted on young Rhesus monkeys, the objective of which was to evaluate a method of treating fracture dislocations of the mandibular condyle[4, 5, 6] Both unilateral and bilateral condylar transections were performed on the monkeys below the attachment of the external pterygoid muscles The condyles were then completely displaced medially out of the joint By means of this surgical procedure, a type of fracture occurring in human beings as a result of trauma to the mandible was simulated in these experimental animals

When the animal condyles were permitted to heal in medially displaced position, malocclusion resulted, and the normal growth of the mandible was interrupted (Fig 242, top) The same dentofacial deformity ensued in all monkeys as would have been expected from a unilateral or bilateral condylectomy, because the growth potential of the mandibular condyle was lost On the other hand, when the condyle was restored to its normal position by open reduction and held there with a Vitallium plate, both the occlusion and the development of the mandible were normal (Fig 242, bottom)

Our initial investigation was expanded to include two other types of experiments, also in young Rhesus monkeys (1) Reconstruction of the temporomandibular joint by means of an autogenous graft containing a growth center (The lateral condyle of the femur and the third metatarsal were used as grafts in this phase) (2) Reconstruction of the temporomandibular joint with a prosthetic implant (Condyles of plastic and Vitallium were used in this portion of the project)

Preliminary results of these two studies, still in progress, are herewith reported

Animal Experiment I Reconstruction of the temporomandibular joint with autogenous grafts from the femur and metatarsal bones —Six monkeys were allotted for this part of the project It was not possible to secure monkeys of a definite age, therefore, weight was the criterion employed to make certain that the animals were young enough to be of value in the investigation Only animals weighing 4 pounds or less were accepted

Grafts from the Femur

The following surgical procedure was carried out for each animal

1 The animal was anesthetized by injecting 90 mg of veterinary nembutal (60 mg per cubic centimeter) into the saphenous vein in the dorsum of the animal's leg

2 An incision was made through the skin and subcutaneous tissues on the lower portion of the left thigh The periosteum was elevated over the distal end of the femur and a saw and chisel were used to remove the lateral condyle The wound was closed with black silk suture

3 A preauricular incision was used to expose the neck of the mandibular condyle The condyle was cut off at the level of the lower limit of the mandibular notch After the graft from the femur was properly shaped, its cartilaginous surface was placed into the glenoid fossa The graft was held in place by means of a vitallium plate and screws

4 Amalgam implants and Vitallium screws served as roentgenographic markers Either amalgam implants or Vitallium screws were placed in the zygomatic process of the temporal bone and in the ramus of the mandible near its union with graft Another incision was made near the angle of the mandible to accommodate another marker near its inferior border

5 Postoperative cephalometric roentgenograms were taken immediately following surgery and repeated at six week intervals in order to follow the outcome of the grafts, markers, plates and screws Cephalometric tracings will be made of these serial roentgenograms and the data correlated with the gross postmortem findings

Comment

The preauricular incision was used to expose the mandibular condyle in all the animals in order to avoid the facial nerve Injury to the facial nerve could cause unilateral paralysis of the facial musculature, which, in turn, might influence development of the bone on that side of the face No evidence of impairment of the facial nerve was observed in any of the animals in this experiment

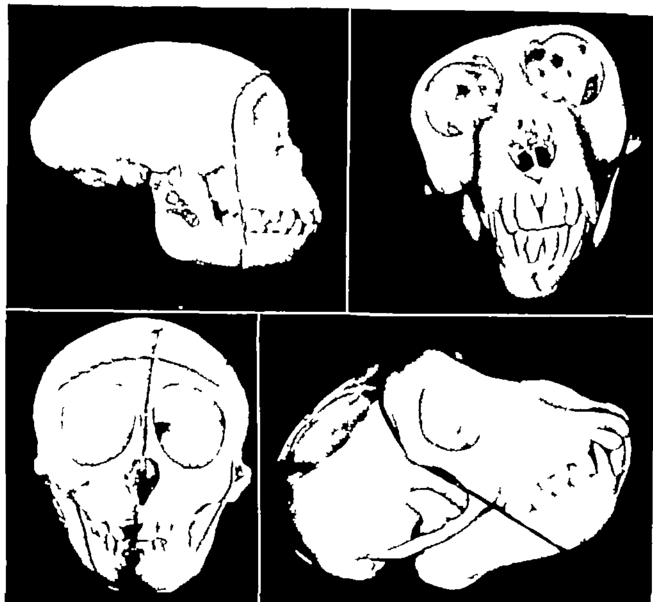


FIG 242 (top left) Projection of the coronoid process above the zygomatic arch, increased antegonial notching and malocclusion indicating a loss of mandibular growth as a result of an untreated unilateral transection and dislocation of the condyle in a monkey (Top right) Malocclusion deviation of the chin, and general underdevelopment of the right side of the face as a result of an untreated transection and dislocation of the condyle (Same animal as in top left picture) (Bottom left) Normal occlusion and mandibular development following a transection and dislocation of a condyle in a monkey treated by means of an open reduction and condylar plating (Bottom right) Symmetrical facial development following transection and dislocation of the condyle treated by open reduction and condylar plating (Same animal as in bottom left picture)

AUTOPSY

Three monkeys were put to death six months postoperatively in order to gain some idea of the outcome of the grafts and the progress of the investigation. The three remaining animals were put to death one year after surgery

GROSS FINDINGS

Postmortem examination and dissection revealed no evidence of an ankylosis the grafts had taken in all six animals A definite capsule of fibrous tissue enclosed the joints on the grafted sides Dissection of the lateral walls of these capsules revealed temporomandibular joints that were reasonably normal, both anatomically and functionally Two compartments separated by what appeared to be a meniscus could be demonstrated in each joint (Fig 243 left)

In five of the six monkeys, no deviation of the

midline nor other signs of malocclusion appeared, and there was no evidence of asymmetry between the right and left sides of the face (Fig 243, right) The coronoid process did not project above the zygomatic arch, and there was no indication of an increased antegonial notch All these factors serve as gross evidence of the success of the graft procedure and suggest that the femur graft did grow and was an effective substitute for the mandibular condyle

Facial distortion and malocclusion in keeping with that resulting from a loss of the condylar growth center did take place in one of the animals We believe that this was due to an early failure of fixation of the graft and its consequent malposition In this animal the screw that held the graft in contact with the Vitallium plate was sloughed out about two weeks after surgery This permitted the graft to slip medially, and because of the pull of the temporal and masseter muscles, the ramus of the mandible was drawn upward so that it partly overlapped the graft Growth of the graft in this position, therefore, was obviously not effective

Plates and screws have been abandoned now as a means of fixing the grafts, instead, a method of wiring the graft to the mandible has been devised which seems certain to prevent such displacement

Microscopic Findings

Microscopic slides were made from the postmortem tissues Vertical sections through the zygomatic process of the temporal bone, the graft, and the ramus of the mandible distal to the graft were examined The results supported the gross findings, namely, that the transplant did survive and grow

The transplants exhibited some necrosis, bone resorption, and active osteogenesis Toward the mandibular fossa of the temporal bone and laterally through the center of the grafts was a zone of young proliferating cartilage (Fig 244, top left) Adjacent to this was newly formed bone In a more inferior portion of the grafts was an area strongly resembling an epiphyseal center of ossification (Fig 244, center left) Below this center of ossification but above the junction of the graft with the ramus were large numerous marrow spaces filled with red marrow (Fig 244, bottom left) Muscle attachment to the grafts was noteworthy These microscopic findings are indicative of growth and vitality with the graft



Fig 243 (left) Occlusion of the teeth and mandibular development following a condylectomy in a monkey Condyle replaced by a graft from the femur Note the capsule, joint space, and Vitallium plate (Right) Normal facial contour following a condylectomy in a monkey, with replacement by a graft from the femur

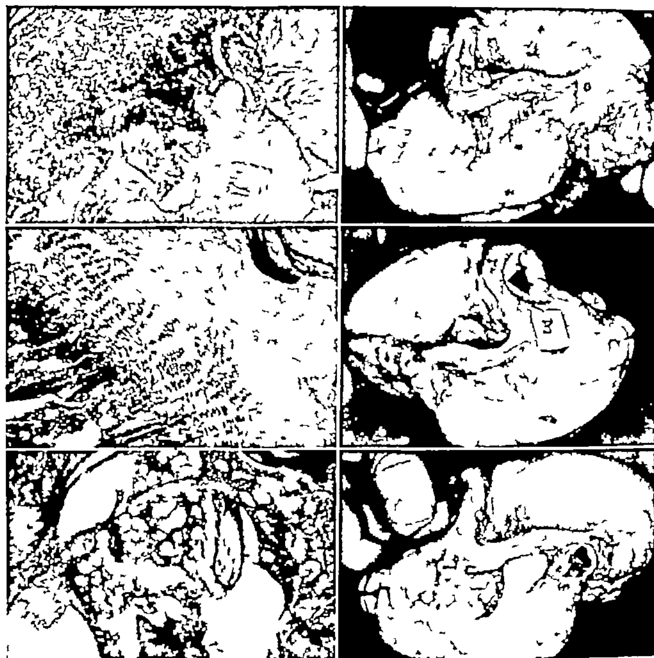


FIG. 244 (top left) Cartilaginous proliferation at the articular surface of the graft adjacent to the glenoid fossa in the experimental monkey (Center left) Epiphyseal center of ossification within the graft showing cartilaginous proliferation and new bone formation in the experimental monkey (Bottom left) Marrow space within the graft inferior to the center of ossification shown in center left picture. (Top right) Unilateral mandibular condylectomy in a monkey Condyle replaced by a metatarsal graft. (Center right) Unilateral condylectomy in a monkey Condyle replaced by an acrylic implant (Bottom right) Unilateral condylectomy in a monkey Condyle replaced by a Vitallium implant.

GRAFTS FROM MONKEY THIRD METATARSAL

The grafts taken from the lateral condyle of the femur were somewhat larger than the normal mandibular condyle and it was necessary in each case to reduce the size of the graft. Some risk of destroying the growth center in the graft in shaping the graft to correspond in size with the excised condyle was overcome by discarding the femur as a donor site and selecting another bone which had a growth potential and was of the same shape and size as the condyle of the mandible A metatarsal bone seemed best suited to meet these requirements moreover its removal is not difficult. Of practical significance is the fact that if this bone is removed in a human being it will not interfere with the function of the foot. Klapp and Schroder[7] as far

back as 1915 reported several cases in which they used the fourth metatarsal as a transplant in gunshot fractures to replace the lost ascending ramus of the mandible. They used the articular head of the metatarsal as a replacement for the condyle in the temporomandibular articulation

Six monkeys were allotted to investigate the suitability of a metatarsal graft as a substitute for the mandibular condyle Except that the third metatarsal was used as a source of the graft instead of the femur, the same surgical procedures already described were carried out on these animals as in the preceding experiment

Two of these monkeys have been put to death for a postmortem examination of their skulls The metatarsal served equally as well as the femur as a substitute for the mandibular condyle (Fig 244, top right)

A histologic examination of the joint tissues is in progress On the basis of existing information, it is anticipated that the grafts from the metatarsal survived and grew

Clinical Application

Two human subjects, a girl, aged 7, and a boy, aged 9, were operated on by one of us (O S), the girl in March, the boy in June of this year Grafts from the second metatarsal were taken These patients are being followed for clinical observation as well as repeated cephalometric roentgenograms The results will be reported at a later date

Experiment II *Reconstruction of the temporomandibular joint by means of a prosthetic implant* (*Vitallium and acrylic*) —There are occasions when it may be necessary to remove the condyle of a mandible, for example, when the condyle is severely comminuted as a result of trauma or when the condyle has been fractured, displaced, and left in malposition for a prolonged period Replacement of such a condyle in an adult is a simpler problem than in a child inasmuch as mandibular growth is no longer a factor Under those circumstances Vitallium and acrylic implants may serve as substitutes for the condyle in reconstructing the temporomandibular joint The use of acrylic and Vitallium implants to restore bony parts has become commonplace, resected or missing portions of the mandible are often restored by this means Kleitsch,[8] for example, replaced not only the condyle but half of the mandible as well by means of a Vitallium implant

An animal investigation of the suitability of such grafts in joint reconstruction is now being conducted Six monkeys are being used in this project In three of the animals a Vitallium condyle has replaced the mandibular condyle whereas in the other three animals, acrylic implants were substituted

One monkey from each group has so far been studied at autopsy In both cases a reasonably normal functional temporomandibular joint was found at postmortem examination (Figs 244, center and bottom right) A collar of bone actually grew around the neck or shaft of the implant and both implants were completely enclosed by a fibrous capsule The implants appeared to be well tolerated by the surrounding tissues

Microscopic studies are now under way similar to the studies of the femur grafts Details will be reported at an early date

Summary and Conclusions

A preliminary report of three animal experiments during the last six years has been presented Twenty-five Rhesus monkeys are employed in this research project

1 The objective of the project is to gain information pertinent to the surgical problems involved in the reconstruction of the condylar portion of the temporomandibular joint

2 An evaluation of the data accumulated at this stage of the investigation has served to (a) substantiate the concept that displaced condylar fractures should be treated by restoring the mandibular condyle to its original anatomic position, (b) demonstrate that it is possible in the experimental animal to substitute the growth potential of a graft from the femur or metatarsal for that of the mandibular condyle, (c) show that Vitallium and plastic condyles are well tolerated by the surrounding tissues in adults, and are apparently effective functional substitutes for the mandibular condyle in the experimental animal

3 Knowledge derived from one phase of the investigation presented here has led to the development of what is believed to be a new surgical procedure for the treatment of early loss of condylar growth centers

4 This procedure of employing a graft from the metatarsal as a substitute for a lost condylar growth center has been performed on two human subjects. The patients both children are being fellowed for continued clinical cephalometric and roentgenologic observations

Editorial comment While these experiments on growing *rhesus monkeys* are valuable as showing the importance of restoring the mandibular condyle in young children to prevent interference with normal growth they do not refute the evidence of clinical experience that in adults where full bone growth has been achieved the displacement or loss of one condyle of the mandible is compatible with acceptable function of the lower jaw and minimal deformity

REFERENCES

1 Sarnat B G and Engel M B Plast & Reconstr Surg 7 364 380 1951
2 Walpole-Day A Dent Record 71 225 1951
3 Smith A., and Robinson M J A. D A 6 304-321 (March) 1953
4. Stuteville Orion Trans Plastic Surgery Section, Novena Asamblea Nacional de Cirujanos Tuxpan Mexico D F 1950
5 Jarabak Joseph and Stuteville Orion J Dent. Res., 31 500 (Aug.) 1952
6 Stuteville Orion, and Jarabak Joseph J Dent Res., 31 515 (Aug) 1952
7 Klapp R and Schroder Die Unterkiefer schubruche Berlin Velag Von Herman Meusser 1917
8 Kleitsch W P J Plastic & Reconstr Surg., 7 244 1951

Réconstruction de l Articulation Temporo-maxillaire Chez le Singe Rhesus. ORION H. STUTEVILLE ET ROBERT P LANFRANCHI.

Présentation d'un rapport préliminaire sur une série d expériences chez l animal avant porté sur 25 singes rhesus Ces expériences visaient à obtenir des renseignements valables sur les problèmes chirurgicaux soulevés par la reconstruction de la portion condylienne de l articulation temporo-maxillaire

L appréciation des données ainsi accumulées a servi à (a) substantialiser la conception selon laquelle les fractures-luxations condyliennes doivent être traitées par la remise en place du condyle mandibulaire dans sa position anatomique originale (b) montrer que l on peut utiliser des condyles en matière plastique ou en Vitallium pour remplacer avec des résultats fonctionnels efficaces le condyle mandibulaire chaque fois que la croissance ne risque pas d intervenir (c) démontrer qu'une greffe autogène contenant un centre de croissance (on a utilisé comme greffon le condyle externe du fémur et le 3e métatarsien) peut être utilisée pour remplacer le potentiel de croissance du condyle mandibulaire chez l animal d expérience

Présentation d une nouvelle technique chirurgicale basée sur l enseignement tiré de ces recherches. Ce procédé pourrait aidér à prévenir les déformations dento-faciales qui se voient après arrêt précoce de la croissance condylienne Cette méthode permet de remplacer par la greffe du second métatarsien les centres de croissance des condyles détruits ou inutilisables. L intervention en question a été pratiquée chez 2 enfants qui sont suivis périodiquement par des examens cliniques, céphalométriques et radiologiques.

Wiederherstellung des Tempero-Mandibulargelenks beim Rhesusaffen. ORION H. STUTEVILLE UND ROBERT P LANFRANCHI.

Ein vorlaufiger Bericht einer Serie von Tierexperimenten zu der 25 Rhesusaffen benutzt wurden, wird gegeben Das Ziel dieser Experimente war Kenntnis in Bezug auf die chirurgischen Probleme bei der Wiederherstellung der condylären Portion des Tempero-Mandibulargelenkes zu erlangen

Eine Auswerung der Gesamtergebnisse führte zu (a) die Anschauungen zu beweisen, dass condyläre Luxationsfrakturen mit der Wiederherstellung der ursprünglichen anatomischen Stellung des Condylus Mandibulae behandelt werden sollten, (b) dass Condylen aus Plastik und Vitallium als ein funktionsfähiger Ersatz des mandibulären Condylus benutzt werden können wenn das Wachstum keine Rolle spielt (c) zu beweisen, dass ein autogenes Transplantat das ein Wachstumzentrum enthalt (lateraler Condylus des Femur und die 3 Metatarsale wurden als Transplantate benutzt) als Ersatz für das potentielle Wachstum des mandibularen Condylus bei den Versuchstieren benutzt werden kann

Auf Grund dieser durch die Versuche erlangten Kenntnisse wurde ein neues chirurgisches Verfahren eingeführt Dieses Verfahren mag dazu dienen dentofaciale Deformitäten zu verhindern welche als Folge frühen Verlustes des Condylenwachstums auftreten Bei dieser Methode werden beeinträchtigte oder zerstörte Condylenwachstumzentren durch ein Transplantat des 2 Metatarsale ersetzt. Diese Operation wurde an 2 Kindern ausgeführt und die Entwicklung bei beiden Patienten wird durch periodische klinische kephalometrische und röntgenologische Beobachtungen verfolgt

Reconstruccion de la Articulacion Temporomandibular en el Macacus Rhesus. ORION H STUTEVILLE Y ROBERT P LANFRANCHI

Reporte preliminar de una serie de experimentos animales para obtener información pertinente relativa a los problemas quirurgicos que afectan la

reconstrucción de la porción condílea de la articulación temporo-mandibular

La evaluación de los datos acumulados a permitido Primero substanciar el concepto de que las fracturas condíleas desalojadas deben tratarse mediante la restauración del cóndilo mandibular a su posición anatómica original Segundo mostrar que pueden ser utilizados cóndilos de plástico y de vitalio cuando el crecimiento no es un factor que lo impida Tercero Demostrar que un injerto autógeno conteniendo un centro de crecimiento (el cóndilo lateral del fémur y el tercer metatarciano utilizados como injertos), pueden ser usados como un substituto para el crecimiento potencial del cóndilo mandibular en animales experimentales

Merced a la información descrita introducen un nuevo procedimiento quirúrgico que puede servir para prevenir las deformidades dento-faciales que resultan de la detención prevoz del crecimiento condíleo

De acuerdo con éste método, el crecimiento condíleo puede restituírse mediante la aplicación de un injerto del segundo metatarciano La operación ha sido efectuada en dos niños cuyo progreso se sigue por observaciones periódicas, clínicas, cefalométricas y roentguenológicas

Editorial Comment While these experiments on growing rheusus monkeys are valuable as showing the importance of restoring the mandibular condyle in young children to prevent interference with normal growth, they do not refute the evidence of clinical experience that in adults where full bone growth has been achieved the displacement or loss of one condyle of the mandible is compatible with acceptable function of the lower jaw and minimal deformity

4 This procedure of employing a graft from the metatarsal as a substitute for a lost condylar growth center has been performed on two human subjects. The patients, both children are being fellowed for continued clinical, cephalometric and roentgenologic observations

Editorial comment While these experiments on growing rhesus monkeys are valuable as showing the importance of restoring the mandibular condyle in young children to prevent interference with normal growth, they do not refute the evidence of clinical experience that in adults where full bone growth has been achieved the displacement or loss of one condyle of the mandible is compatible with acceptable function of the lower jaw and minimal deformity

REFERENCES

1 Sarnat B G and Engel M B Plast & Reconstr Surg., 7 364-380 1951
2 Walpole-Day A Dent Record 71 225 1951
3 Smith A., and Robinson M J A. D A., 6 304-321 (March) 1953
4. Stuteville Orion Trans. Plastic Surgery Section Novena Asamblea Nacional de Cirujanos Tuxpan Mexico D F 1950
5 Jarabak Joseph and Stuteville Orion J Dent Res 31 509 (Aug.) 1952
6 Stuteville Orion, and Jarabak Joseph J Dent Res., 31 515 (Aug) 1952
7 Klapp R., and Schroder Die Unterkiefer schubruche Berlin Velag Von Herman Meusser 1917
8 Kleitsch W P J Plastic & Reconstr Surg., 7 244 1951

Réconstruction de l Articulation Temporo-maxillaire Chez le Singe Rhesus. ORION H STUTEVILLE ET ROBERT P LANFRANCHI.

Présentation d un rapport préliminaire sur une série d expériences chez l animal ayant porté sur 25 singes rhesus Ces expériences visaient à obtenir des renseignements valables sur les problèmes chirurgicaux soulevés par la reconstruction de la portion condylienne de l articulation temporo-maxillaire

L appréciation des données ainsi accumulées a servi à (a) substantialiser la conception selon laquelle les fractures-luxations condyliennes doivent être traitées par la remise en place du condyle mandibulaire dans sa position anatomique originale (b) montrer que l on peut utiliser des condyles en matière plastique ou en Vitallium pour remplacer avec des résultats fonctionnels efficaces le condyle mandibulaire chaque fois que la croissance ne risque pas d'intervenir (c) démontrer qu'une greffe autogène contenant un centre de croissance (on a utilisé comme greffon le condyle externe du fémur et le 3e métatarsien) peut être utilisée pour remplacer le potentiel de croissance du condyle mandibulaire chez l animal d expérience

Présentation d une nouvelle technique chirurgicale basée sur l enseignement tiré de ces recherches. Ce procédé pourrait aider à prévenir les déformations dento-faciales qui se voient après arrêt précoce de la croissance condylienne Cette méthode permet de remplacer par la greffe du second métatarsien les centres de croissance des condyles détruits ou inutilisables. L'intervention en question a été pratiquée chez 2 enfants qui sont suivis périodiquement par des examens cliniques céphalométriques et radiologiques.

Wiederherstellung des Tempero-Mandibulargelenks beim Rhesusaffen. ORION H. STUTEVILLE UND ROBERT P LANFRANCHI

Ein vorläufiger Bericht einer Serie von Tierexperimenten zu der 25 Rhesusaffen benutzt wurden wird gegeben Das Ziel dieser Experimente war Kenntnis in Bezug auf die chirurgischen Probleme bei der Wiederherstellung der condylären Portion des Tempero-Mandibulargelenkes zu erlangen

Eine Auswertung der Gesamtergebnisse führte zu (a) die Anschauungen zu beweisen, dass condyläre Luxationsfrakturen mit der Wiederherstellung der ursprünglichen anatomischen Stellung des Condylus Mandibulae behandelt werden sollten (b) dass Condylen aus Plastik und Vitallium als ein funktionsfähiger Ersatz des mandibulären Condylus benutzt werden können, wenn das Wachstum keine Rolle spielt (c) zu beweisen dass ein autogenes Transplantat das ein Wachstumszentrum enthalt (lateraler Condylus des Femur und die 3 Metatarsale wurden als Transplantate benutzt) als Ersatz für das potentielle Wachstum des mandibularen Condylus bei den Versuchstieren benutzt werden kann.

Auf Grund dieser durch die Versuche erlangten Kenntnisse wurde ein neues chirurgisches Verfahren eingeführt. Dieses Verfahren mag dazu dienen, dentofaciale Deformitäten zu verhindern, welche als Folge frühen Verlustes des Condylenwachstums auftreten Bei dieser Methode werden beeinträchtigte oder zerstörte Condylenwachstum zentren durch ein Transplantat des 2 Metatarsale ersetzt. Diese Operation wurde an 2 Kindern ausgeführt und die Entwicklung bei beiden Patienten wird durch periodische klinische kephalometrische und rontgenologische Beobachtungen verfolgt

Reconstruccion de la Articulacion Temporomandibular en el Macacus Rhesus. ORION H STUTEVILLE Y ROBERT P LANFRANCHI.

Reporte preliminar de una serie de experimentos animales para obtener información pertinente relativa a los problemas quirurgicos que afectan la

petechial and purpuric in character and had a tendency to coalesce

On admission the child appeared acutely ill, somewhat cyanotic and in shock Temperature was 101 degrees Neurological examination was negative except for slight ankleclonus The clinical impression was that of acute meningococcemia with Waterhouse-Friederichsen Syndrome

Lumbar puncture on admission showed clear fluid, 62 per cent protein, 1 plus Pandy and no cells Culture of this fluid was subsequently reported as negative Blood count showed hemoglobin 62 per cent, RBC 3,140,000 WBC 5,530 with differential as follows segmented neutrophils 20 per cent, non segmented neutrophils 8 per cent, small lymphocytes 66 per cent, large lymphocytes 6 per cent Blood culture was taken Treatment was started with penicillin, 200,000 units every three hours, sodium sulfamethazine subcutaneously, cortisone intramuscularly, oxygen and synkovite

Six hours after admission the condition of the child was grave Purpura had increased in number and area On the face it covered the nose, cheeks and upper lip as one plaque of necrosing skin Similar areas of necrosis of varied sizes appeared elsewhere on the body The largest one involved the scrotum, and the skin over the right knee The tips of the little fingers and toes were gangrenous Respiration was rapid and grunting in character and there was an ashen cyanosis of the uninvolved skin In addition there was marked abdominal distention and the child was emesing coffee ground material in large amounts Treatment consisted of aspiration of the stomach and intravenous administration of blood, glucose and saline

Eighteen hours after admission, the child's condition was rapidly deteriorating Respiratory distress had increased Pulse was rapid at about 180-200 per minute Rales were heard in the left base Abdominal distention was marked and contributed to respiratory difficulty The spleen was now palpable and firm, about two fingers below the costal margin and the liver edge could be felt at the level of the umbilicus In addition there was a generalized edema which was attributed to cardiac-decompensation and possibly in some degree to over-hydration and cortisone effect These symptoms were treated with caffeine, sodium benzoate and digitalization

On the second hospital day, abdominal distention persisted and the child continued to have coffee ground vomitus Edema had decreased The purpuric areas had now become black and showed all the characteristics of gangrene with demarcation Prostigmine was given to overcome the severe abdominal distention

The following day the child appeared more alert The gastric bleeding was not as marked and abdominal distention had diminished The child was beginning to take fluids orally and cardiac failure was being overcome

On the fourth day a necrosed area on the lower half of the nose began to collapse causing obstruction of the nares The skin of the scrotal sac was sloughing and was discharging yellowish fluid of foul odor On this day the blood culture was reported positive for the meningococcus

During the ensuing week the child's general condition improved The areas of gangrenous skin were sharply demarcated and began to separate The slough involved the tip of the nose, most of the upper lip, skin of the cheeks, a portion of the ear lobes (Fig 245, top left), the tips of the little toes and little fingers, approximately half of the scrotal sac, and small areas on the knees, heels and abdomen During this period he was maintained on blood transfusions and high doses of antibiotics Temperature was finally normal on the eighth hospital day

Thereafter the child's condition improved rapidly The necrotic eschars were debrided gradually, leaving clean granulations About two weeks later split-skin grafts were applied to the granulating surfaces on both cheeks A week later all dressings on the face were discarded During the following three weeks the remaining sloughs on the extremities and scrotum healed by cicatrization

The defect on the face involved the distal two-thirds of the nose and the central one-half of the upper lip Pyriform apertures formed the external nasal openings The maxillary alveolus and the anterior nasal spine were exposed Only a small fragment of septum remained posterior to the pyriform opening (Fig 245, top right)

Two months later, after the child gained weight, the lip was repaired (see diagram) (Fig 245, bottom) This procedure also narrowed the originally huge nasal opening

There remained the problem of nasal reconstruction My original inclination was to discharge the child from the hospital and delay

IV

NOSE

Total Rhinoplasty in Infants—Report of a Case of Waterhouse-Friderichsen Syndrome. MICHAEL L LEWIN, M D, *New York, N Y, U S A*

Acute Adrenal Cortical Insufficiency known as the Waterhouse-Friederichsen Syndrome was originally reported by Voelker in 1894 but was studied in conjunction with meningococcus septicemia (meningococcemia) by the two authors whose name it bears.[1] While it is primarily known in pediatric practice as a complication of meningococcemia it occurs though less frequently during the course of other septic diseases. It also occurs in adults under similar conditions The underlying pathology is an acute damage of the adrenal cortex, usually in the form of massive hemorrhage

Some of its symptoms cannot be differentiated from the accompanying septicemia, but its main manifestation is an acute peripheral vascular collapse Profound shock, severe cyanosis dyspnea rapid pulse drop in blood pressure hyper pyrexia purpura comatose state develop in a matter of hours. At the height of the peripheral vascular collapse gangrene of distal parts fingers and toes has been known to occur

Waterhouse-Friederichsen Syndrome formerly had such a high rate of mortality that some authors questioned the diagnosis in the few surviving cases despite the fully developed symptomatology However the introduction of cortisone offered an effective means of rapid substitution therapy and the progress in antibiotics provided powerful agents in combatting the underlying septicemia.[2]

Petechial hemorrhages in the skin may accompany any severe septicemia. The meningococcus infection seems to show a particular predilection to such hemorrhagic eruptions. Bacterial emboli in the peripheral capillaries lead to inflammation of the endothelial lining thrombosis, extravasation and cutaneous hemorrhages. Confluent areas of hemorrhages on the trunk and extremities are known to be several inches in diameter and lead to extensive sloughs.

In 1943 Thomas[3] reported a series of 1935 cases of meningococcus septicemia from the U S. Army Several cases exhibited skin sloughs, and in two cases the necrotic areas were large enough to require skin grafting (Out of the 46 autopsied cases 18 showed the characteristics of Waterhouse-Friederichsen Syndrome.)

Heretofore the problem of repair received little attention since few of these cases have survived However with improved therapy it can be anticipated that more of them will be salvaged in the future and may require rehabilitation by some form of reconstructive surgery

*Report of a case** A two-month-old infant previously in good health was admitted to the hospital January 23 1953 because of generalized purpuric eruption fever signs of shock, and extreme toxicity The onset of illness was abrupt occurring approximately six to eight hours prior to admission when the child began to cry and to draw his thighs up to his abdomen as if suffering from intestinal cramps. Temperature was normal at that time and there was no vomiting or diarrhea. Within four hours an eruption was noted on the upper and lower extremities and on the face and the child became extremely restless The eruptions were

* The pediatric care of this case was in the hands of Dr Onver Mahadeen, whose cooperation throughout the entire surgical treatment, and in preparation of this report is gratefully acknowledged.

two reconstructions employ abdominal flaps from either side, brought to the face via the forearm, thus leaving the forehead tissue available for the final reconstruction which is to be performed upon reaching maturity Tissues from previous reconstructions are utilized for the lining when the larger nose is made

Can a reconstructed nose in a child be so over-corrected as to still be acceptable at maturity? Obviously some over-correction is imperative in anticipation of the constant growth of the facial features and it can only be accomplished at the expense of the immediate cosmetic result However, this must be done within reasonable limits so that the earlier result will not appear too grotesque Penn[10] considers a permanent nasal reconstruction in an infant feasible with an adequate over-correction and performs it with a forehead flap The final modeling is delayed until later in life

Reconstruction The plan adopted in this case was based on the assumption that the reconstructed nose would not be the final one, and so every precaution was taken not to jeopardize the future reconstruction It was felt that little would be gained by postponing this operation until the child was three or four years of age and the advantage of operating upon a somewhat larger child would be more than offset by the problems of caring for the infant during the intervening time It was planned to complete the nose at about one year of age, which can be considered as the end of a period of most active growth (An infant triples his weight and gains 25 per cent of his length during the first year The next period of comparable relative growth would be six to eight years)

As a preliminary operation, it was necessary to insure the patency of the nasal passages and to eliminate the heavy scarring around the nasal opening The cicatricial tissues around and inside the nasal cavities were excised and the skin was approximated to the mucosa The airways were then watched during the subsequent three months to ascertain that each nasal cavity would admit at least a size 18 catheter

The actual reconstruction started when the child was eight months old A tubed flap was formed on the right abdomen, measuring about three inches in width and four and one-half inches in length The abdominal defect was closed by approximation

In selecting the abdomen as the source of the flap it was possible to obtain sufficient skin for over-correction without secondary skin grafting Scarring was concealed and negligible Common sites for adult rhinoplasty flaps, like frontal, brachial or cervical were not interfered with The thickness and coarseness of abdominal skin in adults which makes it undesirable for nasal reconstruction was less pronounced and objectionable in an infant

About a month later, the lateral end of the abdominal tube was attached to the volar surface of the left forearm A trap-door flap was delayed on the dorsum of the nasal stump to serve as a lining (Fig 246, top left)

Two weeks later the medial end of the abdominal tube was delayed under local anesthesia After an additional week the skin tube was transferred to the nose The lining flap was re-

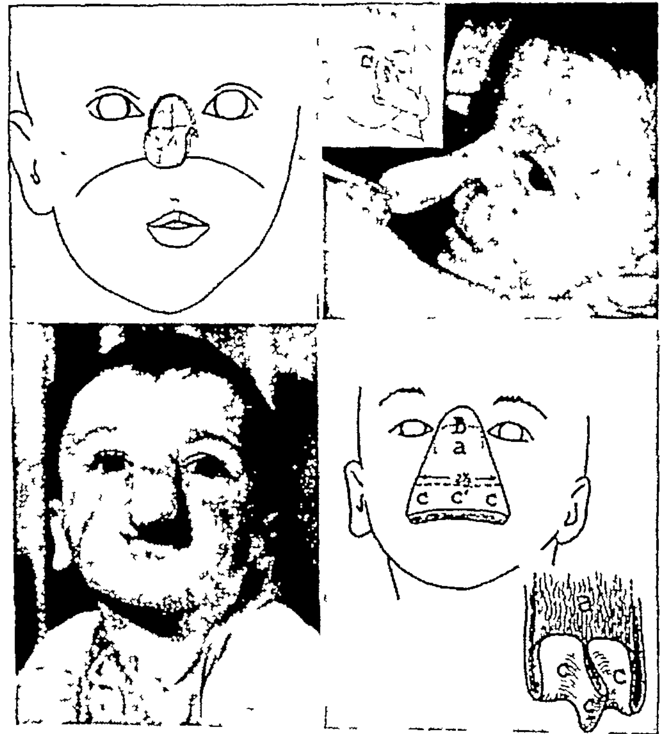


Fig 246 (top left) Lining flap from nasal stump This also offered an adequate area for attachment of abdominal flap By resurfacing the entire nose with uniform flap, discrepancies in color and texture will be less noticeable (Top right) Abdominal tube inserted into nose ready to be severed from intermediate attachment to forearm Diagram of attachment a, Lining flap b, Inserted portion of abdominal flap

(Lower left) Abdominal skin tube attached to nose Entire flap was used for reconstruction (Lower right) Diagram of rhinoplasty (a) Lining flap (b) Portion of abdominal flap originally attached (c) Vestibular infoldings (c^{-1}) Columella



FIG 245 (top left) One week after onset of disease Necrotic plaque on face begins to separate. (Top right) After recovery from septicemia and after skin grafting of both cheeks. (Bottom) Repair of upper lip Flaps a and b were outlined by existing scars Sharp dissection was necessary because of scar tissue rigidity Scar on lip was zigzagged. This procedure also established foundation for future nasal reconstruction

further elective surgical intervention for at least a few years. However the parents adamantly refused to accept the child.

Nasal prosthesis In an effort to find a temporary non-surgical solution a nasal prosthesis was tried only to convince me of its impracticality During the operation for repair of the lip an impression was taken of the midportion of the face and several prosthetic noses were constructed from acrylic and latex.* However it was impossible to maintain the prosthesis in place Intranasal attachments were not tolerated. External adhesive caused constant severe irritation The infant reacted to the prosthesis by pulling it off at the first opportunity or vigorously rubbing it off against the bed

Reconstructive rhinoplasty in children It has been established that skin grafts and flaps incorporated into growing parts keep pace with their growth This does not apply to a reconstructed nose The growth of the nose depends upon the activities of the supporting bony and cartilaginous structures. The growth of the soft tissue mantle follows Severe retardation of the nasal growth (with soft tissue deficit) is known to result from extensive destruction of the septum in childhood. Where there is almost complete absence of the septum, it would be unrealistic to anticipate any growth from a substitute soft tissue structure attached to the face.

A number of cases are on record of infants operated on for nasal defects where the supporting framework was intact and reconstruction consisted of realignment of distorted structures and utilization of local tissues, sometimes in conjunction with a free-skin graft. Similarly when rudimentary useless appendages were present immediately adjacent to the nasal defect, they were utilized for partial reconstruction and incorporated into the deformed nose. In almost all these cases additional surgery was required in later years but substantial improvement was accomplished at an early age. However according to the meager references in the literature on congenital absence and semi-absence of the nose (no information could be found on treatment of traumatic deformities in infants) when the supporting structures were missing and the nose had to be reconstructed with a distant flap reconstruction was delayed until the individual reached maturity or close to it.[4, 5, 6]

From the anatomical viewpoint, this attitude seems fully justified However most surgeons today are more acutely aware of the psychological needs of the disfigured child and his parents and realize that some modification of this position is warranted. The impact of the repulsive deformity on the personality of the child and his family is such that some compromise of the surgical plan in favor of early surgery must be considered[7, 8] The problem is to determine a surgical plan which will relieve the situation without jeopardizing the result one hopes to achieve later

Most surgeons feel today that some effort at reconstruction should be made between three and four years of age Kilner's[9] plan is that such a child would need three successive nasal reconstructions. The first is performed at the age of three with a slight over-correction and is supposed to be adequate until late childhood at which time the second nose is made. These

* Drs. J Giordano and G DeYoung.

plasty was performed before the end of the first year of age Consideration for the psychological development of the child and for the life of the family demanded that the surgical reconstruction be performed as early as possible It was accepted that the reconstructed nose would have to be replaced by another one later in life It is suggested that a similar policy be adopted in other cases of severe congenital or acquired deformity

REFERENCES

1 Holt, L E, Jr, and McIntosh, R Holt Pediatrics, 12 edition, Appleton-Century-Crofts, Inc, New York, 1953
2 Hugenbobler, F, and Hoigue, R Schweiz Med Wochschrift, 84 4-16, 1954
3 Thomas, H M J A M A, 123 264, 1943
4 Blair, V P, and Brown, J B Surgery, Gynecology and Obstetrics, 7 415, 1951
5 Smith, Ferris Plastic and Reconstructive Surgery, 7 415, 1951
6 Smith Plastic and Reconstructive Surgery, W B Saunders, Philadelphia, 1950
7 Smith, Ferris Personal Communication
8 Webster, J P Personal Communication
9 Kilner, T P Personal Communication
10 Penn, Jack Personal Communication

Rhinoplastie Totale Chez le Nourrisson. MICHAEL L LEWIN

Compte-rendu d'un cas d'un nourrisson de 2 mois qui a survécu à une septicémie à méningocoque avec synrome de Waterhouse-Friederichsen Les lésions purpuriques ont été si graves et si étendues qu'elles ont entraîné une liquéfaction massive de la lèvre supérieure du nez, des joues, du scrotum, etc Tout le support cartilagineux du nez s'est trouvé détruit

La réhabilitation de l'enfant a consisté en greffes cutanées des ulcérations des joues, en réparation de la perte de substance labiale et en rhioplastie à l'aide d'un lambeau abdominal, le tout effectué avant que al malade n'ait atteint l'âge d'un an L'auteur recommande la rhinoplastie reconstructive à un âge aussi jeune de façon à éviter tout retentissement sur le développement tant physique que mental du nourrisson Il ne considère cependant pas une telle reconstruction comme permanente

Vollstandige Nasenplastik bei Sauglingen. MICHAEL L LEWIN

Der Fall eines zwei Monate alten Sauglings wird gezeigt, der eine Meningococcenseptikamie mit Waterhouse- Friederichsen- Syndrom überlebte Die Purpura- Lasionen waren so schwer und ausgedehnt, dass eine Sequestrierung von Weichteilmassender, Oberlippe, der Nase, der Wange, des Scrotums und anderer Korperteile resultierte Der gesamte knorpelige Stutzapparat der Nase war zerstort

Die Wiederherstellung des Kindes bestand in der Deckung der Wangengeschwure durch Hauttransplantationen, Verschluss des Lippendefektes und Nasenplastik mit einem Bauchlappen, ausgefuhrt vor Vollendung des ersten Lebensjahres Die wiederherstellende Nasenplastik in einem so fruhen Alter wird mit Hinsicht auf die korperliche und geistige Entwicklung des Kindes empfohlen Eine derartige Wiederherstellung wird jedoch nicht als endgultig betrachtet

Rinoplastia Total en Infants. MICHAEL L LEWIN

Se presenta un caso de un niño de dos meses que sobrevivió a una septicemia meningocócica con síndrome de Waterhouse-Friederichsen Las lesiones purpúricas fueron tan severas y extensas que dieron como resultado la presencia de una escara de tejido masivo suave en el labio superior, la nariz, las mejillas, el escroto y otras regiones Toda la estructura cartilaginosa de la naríz fue destrúída

La rehabilitación del niño consistió en la aplicación de injertos de piel sobre las ulceraciones de las mejillas, la reparación del defecto del labio y rinoplastía con un colgajo abdominal efectuada antes de cumplir un año de edad La rinoplastía reconstructiva a tan temprana edad se recomienda tomando en cuenta el desarrollo físico y mental del niño Dicha reconstrucción, sin embargo, no se considera defintiva

---

A New Method of Nasal Reconstruction.

A H REHRMANN, M D, *Westdeutsche Kiefer Klinik, Solonanderstrasse 12, Dusseldorf, Germany*

I

The methods for nasal reconstruction may be divided into two groups The usual method consists of repair of the soft tissues and the insertion of a framework, the latter part usually done at a later date This method may give satisfactory results When using a forehead-flap, though, this may have shrunk when the time for insertion of an implant has arrived Furthermore, the insertion and buttressing of a strong rectangular piece of cartilage, fitted with two other pieces for the alae, is somewhat difficult through the small incisions at the columella and along the nostrils

The second principle, a reconstruction of the nose by means of tissue flaps with implants incorporated, is an uncommon and unsatisfactory method in view of the shape of the nasal

flected towards the nasal cavity and the distal 1¼ inch of the skin tube was opened and defatted. The attachment started at the glabella. The flap had to be trimmed somewhat to fit the defect but as much as possible of it was inserted even at the expense of excessive bulk on the dorsum of the nose. The arm was held in place with adhesive strips joining it to a stockinet covering the infant's head (Fig 246 top right)

Two weeks later the flap was severed close to the attachment to the arm The cut ends were closed by a suture (This was done on the ward without anesthesia) The skin tube attached to the nose extended to the level of the mouth and had to be kept raised with adhesive strips fastened to the forehead in order not to obstruct the breathing (Fig 246 bottom left)

The flap was allowed to settle for a period of almost two months. It was then untubed, the scars were excised and the flap was thoroughly defatted The nose was formed in a routine fashion with vestibular infoldings sutured to the lining flap The entire available flap was utilized. Its maximum width across the nasal tip was approximately 2¼ inches (Fig. 246 bottom right) The stump of the tube on the forearm was excised and discarded.

The dimensions of the rhinoplastic flap used for this reconstruction approximated those in adulthood. The over-corrected shape was maintained without any support for the present. The contour of the nose could be improved a great deal by the usual surgical modeling thinning of the columella and alae, correction of irregularities etc. It could easily be made more in keeping with the child's age by lowering the tip and removal of the excessive skin on the dorsum. None of this was done Instead it was explained to the parents that the child would grow up to his nose."

During the year which has elapsed since his discharge, marked improvement has taken place. The nose appears less bulky and more in keeping with the face (Fig 247)

As far as the scarring and skin grafts on both cheeks were concerned it was felt that they could eventually be eliminated by repeated partial excisions and advancement or rotation of the surrounding cheek. On two occasions while the abdominal flap was being moved to the face when the operation was not too lengthy fragments of the graft were excised and the surrounding skin was advanced. However there seemed to be no reason for subjecting the child to additional surgery at this time.

Summary A case of meningococcemia with Waterhouse-Friedenchsen Syndrome in a two-months-old infant has been presented. Extensive soft tissue sloughs developed rapidly at the height of the disease, involving primarily the face. Severe facial disfigurement resulted, consisting of loss of nose, parts of the upper lip and large defects on the cheek

The surgical rehabilitation consisted of immediate skin grafting to eliminate any open wounds and to minimize scarring early repair of the lip and reconstruction of the nose Total rhino-



Fig. 247 (A and B Reproduction from Kodachrome) Patient at age of year-and-a-half Nose is greatly over-corrected Redundant skin on dorsum is responsible for appearance of excessive width of bridge Depression of middle third of bridge posterior to tip will probably become more pronounced within next year or two Plan is to insert a narrow preserved cartilage implant along dorsum Such implant can be replaced by larger one when needed.

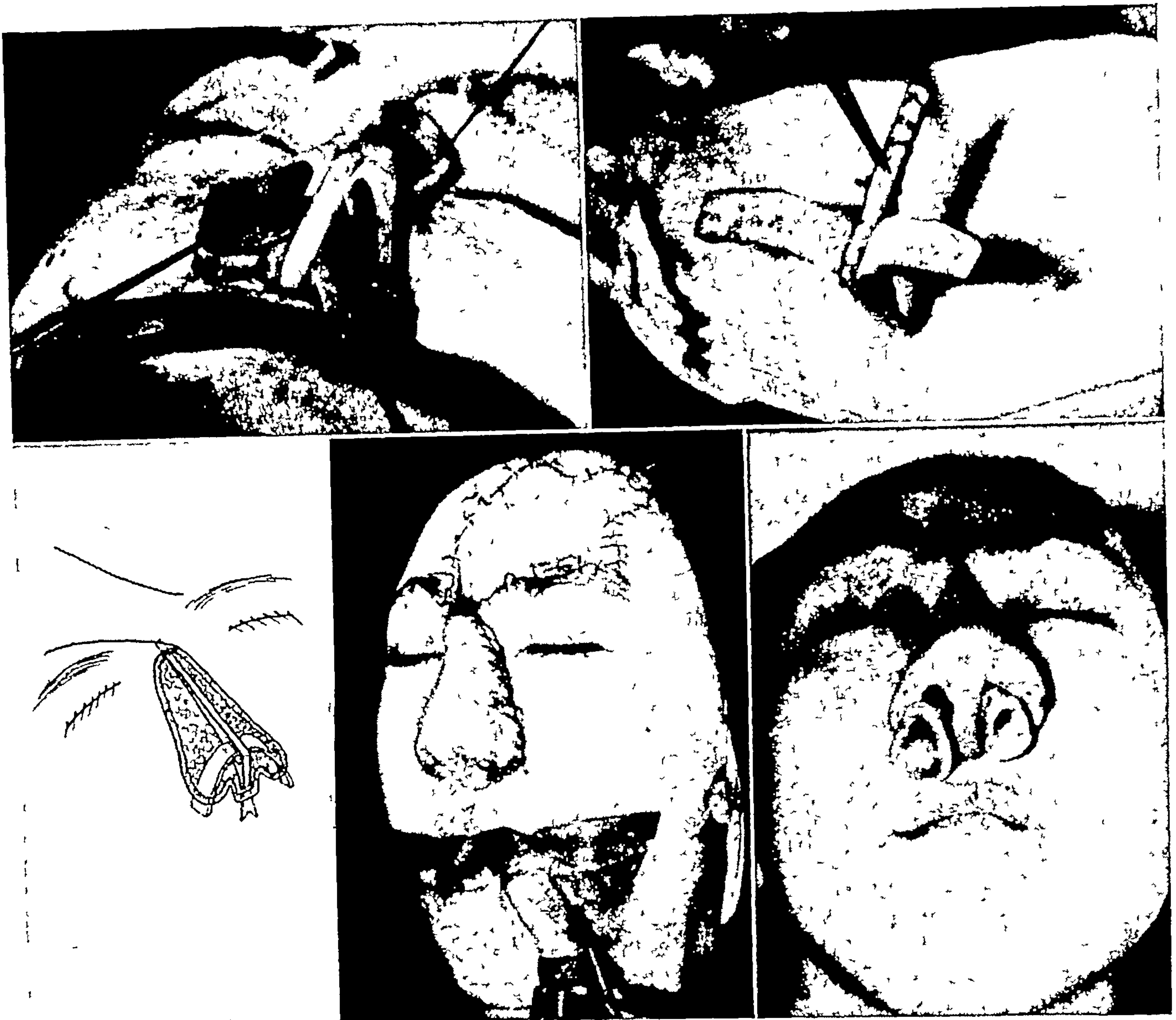


FIG 249 (top left) Forehead-flap is outlined Lining flaps from the nasal skin turned down, the autogenous cartilaginous framework inserted and fixed (Top right) Cartilaginous framework consisting of three parts, one right-angled and two lateral pieces, united with 0,1 mm stainless steel sutures (Bottom left) Principle of the rebuilding of the nose The cartilaginous framework has been inserted and will be covered immediately with the forehead flap (Bottom center) Forehead-flap shifted and sutured, forehead grafted (Bottom right) Nasal airways have been opened and grafted

top right) Before sawing the mucous membrane is elevated from the inner surface of the nasal bones in order to prevent a perforation (Fig 251, top right) The deviated septum is straightened after the lateral cartilage has been separated close to the septal cartilage and the mucous membrane elevated on one side A right-angled piece of autogenous cartilage is inserted (Fig 251, bottom)

Comments By the external exposure one can shape the bony and cartilaginous parts of the nose exactly under direct inspection and avoid postoperative disfigurement due to misplacement If the operation is done with the utmost care, perforation of the mucous membrane is avoidable If it has to be opened in course of a reduction of the profile, especially in hooked noses, the margins can be sutured in most cases and a individually shaped implant inserted As yet we have not seen any suppuration

We are aware of the merits of the intranasal technique but believe that it has been grossly overestimated The advantages of the external exposure are striking and during the last two years we have used it in nearly all cases of corrective rhinoplasty

framework and of the dependence of the implant upon a blood supply from the flap

We have performed the restoration on two hypoplastic noses using a third method by inserting a cartilaginous framework into the open nasal wound and immediately covering it with a forehead flap In these cases the major part of the lining was present and had only to be completed around the nostrils by turning down the skin of the top of the nose.

Case report 1 This girl, aged 16 had been operated upon in childhood because of a cleft lip and palate and now wanted a better nose. Figure 248 shows the hypoplastic nose and the reconstructed one. Figure 249 illustrates the surgical method employed By means of the delayed flap-technique *one flap from the forehead* and two of the top of the nose were formed the remaining nasal skin being cut in the midline (Fig 249 top left) The figure shows the cartilaginous framework inserted This consists of one strong right-angled piece of cartilage and two other pieces fixed with fine wire (Fig 249 top right) The implant is held in the right position by submerging the upper end into a subcutaneous pocket and the other ends by supporting them on the surface of the maxilla and the nasal spine. Such a framework will not deviate or collapse (Fig 249 bottom left) Figure 249 bottom center shows the covering flap and the forehead grafted

Comments I believe this method to be acceptable also in total nasal defects. In two cases we restored the lining with flaps of the tubed type but the main operation has not yet been performed. In such cases it is advisable to close the entrance of the nasal cavity completely with the lining flap in order to get a good and non-infected bed for the implant. The remainder of the restoration is the same as described above In any case the nostrils have to be opened by dissecting the tissue inside of the alar cartilages followed by grafting as seen in Fig 250 bottom right.

The flaps used must necessarily have an excellent blood supply and the sutures must not be under tension in order to avoid necrosis and infection.

II.

Our technique of corrective rhinoplasty is next described. We have avoided the intranasal



Fig. 248 Hypoplastic nose before and after restoration

method more and more and we prefer the external exposure as seen in Fig 251

Case report 2 Figure 250 shows a traumatic deformity of the nose and the result of the correction. The approach is outlined in Fig. 251 top left. The columella is cross-cut and the nasal skin elevated up to the nasal bones. Under direct vision the nasal bones are sawn through at four places and the bridge narrowed (Fig 251

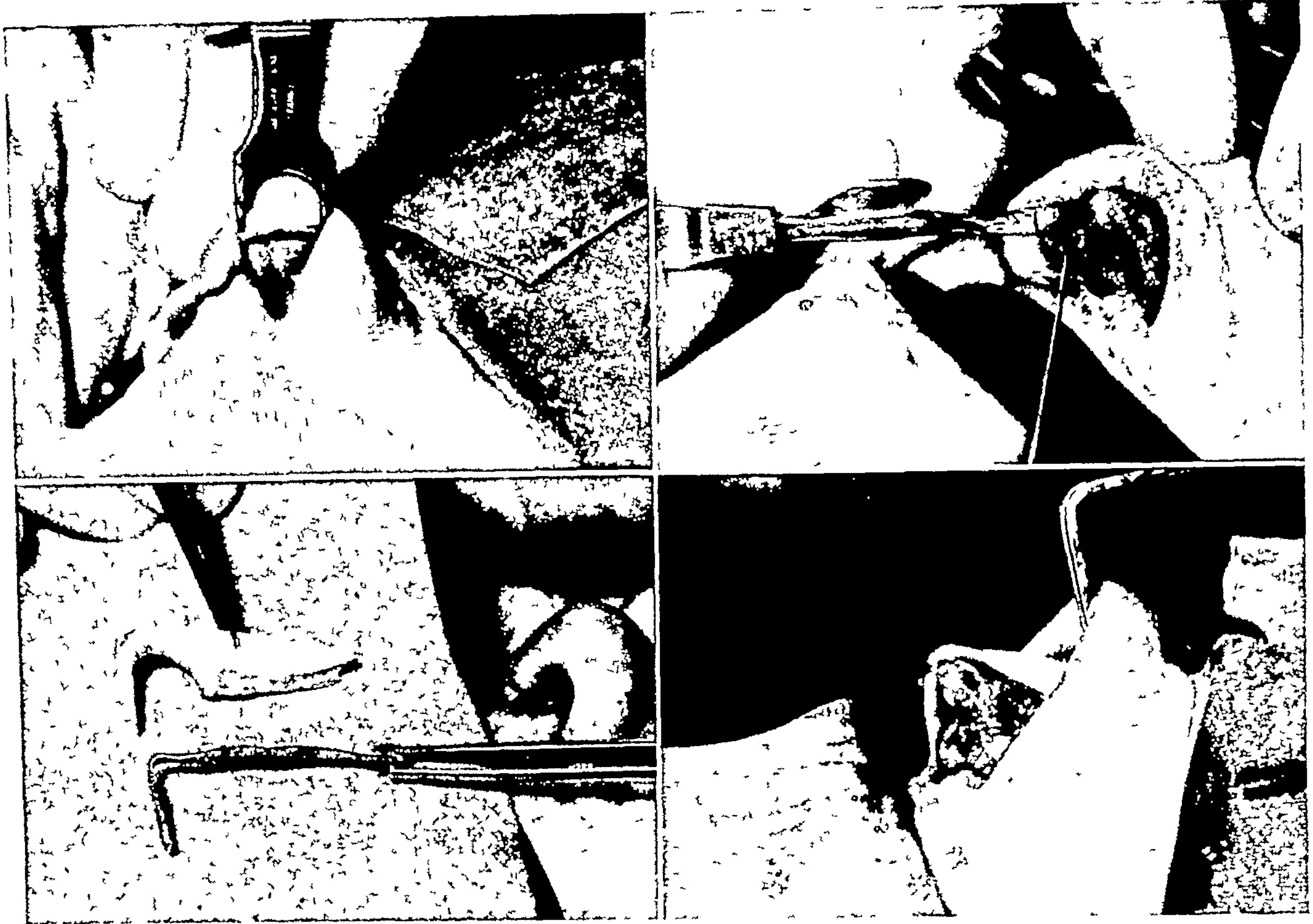


FIG 251 (top left) The surgical approach is outlined (Top right) right-angled saw brought into position (Bottom left) Autogenous rib-transplant is shaped after a flexible tin model (Bottom right) Cartilage-graft in position and adapted to the alar cartilages

DISCUSSION

Professor Janudz Bardach, Lódź, Poland I should like to demonstrate the results of some cases of total and subtotal rhinoplasty which always has been a problem in plastic surgery The use of the tubed pedicle flap has supplied a sufficient amount of material to form the nose without doing any harm to the surrounding tissues of the face

The method described by Chitrov in 1947 consists in excision of all fat tissue from the skin tube, its duplication and formation of the missing parts of the nose in a one-stage operation In this manner both the inner lining and outer covering of the nose are supplied by skin completely deprived of fat tissue A solid support is given to the nose by insertion into the duplicated skin fold a cartilage auto- or homograft within one or two months after the first operation In order to match the color of the skin of the face an abrasion of the transplanted skin is done in a final operation

The original method of Chitrov was modified by Vassiliev, Rutko and myself with the aim of providing a firm support to the soft tissue transplanted and to avoid the danger of a possible necrosis at the site of the duplication of the skin

Klinika Chirurgii Szczekowo-Twarzowej, Kopcinsklégo 22, Lódoz, Poland

---

An Easy Method of Bone Grafting for Saddle Nose.

GIANFRANCO STUCCHI, M D, *Via Locatelli 14, Bergamo, Italy*

The saddle nose has always drawn surgeons' attention owing to the serious disfigurement it entails For its correction all graft materials have been used and every type of material has had "waves of popularity and decline" as King says [1]

An ideal graft material to make up for the loss of substance of nose framework should have

Une Nouvelle Méthode pour la Réconstruction du Nez. A. H Rehrmann

Ayant à traiter 2 nez hypoplasiques l'auteur a utilisé une méthode de reconstruction qui n'a pas été décrite à ce jour Cette méthode a consisté à préparer la plaie nasale à façonner et à insérer un support cartilagineux sous vision directe et à recouvrir immédiatement le tout à l'aide d'un lambeau prélevé sur le front Dans les cas en question la bordure existait. Dans les malformations totales ou subtotales il sera nécessaire de rétablir préalablement une bordure Cette méthode permet de gagner du temps et évite le ratatinement des lambeaux frontaux quand on utilise ces derniers

En second lieu l'auteur décrit sa méthode de rhinoplastie correctrice Il utilise une voie d'abord extra intranasale et décolle complètement la peau du nez si c'est nécessaire Cela rend possible toutes les corrections que l'on veut sur la partie tant osseuse que cartilagineuse du nez y compris la mise en place d'un greffon sous vision directe, le tout étant accompli en une seule opération Tout en appréciant le mérite de la technique intranasale l'auteur pense qu'on a exagéré sa valeur dans le passé

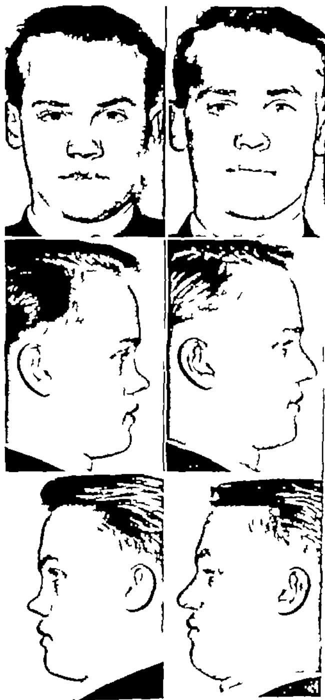


Fig. 250 Traumatic saddle nose before and after corrective rhinoplasty

Eine Neue Methode der Nasenplastik. A. H. Rehrmann

Wir haben bei zwei hypoplastischen Nasen den bisher in der rekonstruktiven Nasenplastik noch nicht verwendeten Weg benutzt, nämlich nach Praeparation der Nasenwunde ein knorpeliges Stützgerüst unter Sicht des Auges aufzubauen und sogleich mit einem Stirnlappen zu bedecken. In unseren Fällen war die nasale Schicht vorhanden. Bei totalen oder subtotalen Nasendefekten ist die Methode ebenfalls zu verwenden setzt jedoch die vorherige Bildung der nasalen Schicht voraus. Die Methode ist zeitsparend und lässt im Falle der Verwendung von Stirnlappen eine Schrumpfung vermeiden

Zweitens wurde unsere Methode der korrektiven Nasenplastik beschrieben die darin besteht, die Haut der Spitze oder der ganzen Nase nach einem extra-intranasalen Schnitt abzupraeparieren und unter Sicht des Auges sämtliche notwendigen Korrektionen im knöchernen und knorpeligen Anteil einschliesslich der Einfügung eines Spans vorzunehmen.

Un Nuevo Metodo de Reconstruccion Nasal. A. H. Rehrmann

En dos narices hipoplásticas usamos un método de reconstrucción aun no descrito Consiste en preparar la herida nasal formando e insertando una estructura cartilaginosa bajo visión directa y cubriéndola inmediatamente con un colgajo de la frente En éstos casos existía aun la cubierta mucosa. En defectos totales o subtotales es necesario le restauración preliminar de dicho forro mucoso El método ahorra tiempo y evita la retracción del colgajo frontal cuando éste se usa.

En segundo lugar se describe nuestro método de rinoplast correctora. Nosotros usamos la vía de acceso extra-intranasal y podemos elevar completamente la piel nasal si lo deseamos. Todas las correcciones en el hueso y porción cartilaginosa de la nariz incluyendo la inclusión de un implante, se pueden hacer bajo la visión directa en una simple operación. Nosotros apreciamos los méritos de la técnia intranasal pero creémos que ésta vía de acceso ha sido sobreestimada en sus cualidades.

antibodies killing the cells of the graft which will later meet with absorption The absorption time varies in the different forms of graft—cartilaginous or bone—and depends on the greater resistance which the intercellular material opposes to the cells themselves Cartilage rich in intercellular material is more resistant to absorption than bone Sometimes cartilage tends to ossification But the homograft, as such, does not survive transplantation and is transformed into a different tissue by the host

On account of the unsuccessful result of hetero- and homografts, autogenous grafts were tried They have been acknowledged by most people as the only really successful grafts Lyndon Peer has proved [8] and my own experiments tend to show that they are successful [9]

Two substances are used cartilage and bone which both have advantages and disadvantages The cartilage is more easily shaped, more elastic and therefore more suitable as a framework to such a part exposed to slight trauma as the nose It is also more liable to infections and distortions Bone on the other hand is hard, stiff, difficult to shape, yet it resists infections and distortions better

Personally I prefer the bone graft Both materials require an unpleasant operation to obtain Therefore they also cannot be considered ideal graft materials

In saddle noses of post-traumatic type in which there is almost a fracture of the septum with relative breathing difficulty and it is necessary to operate on the septum itself, I have thought and noticed that it is advantageous to graft into the concavity of the nose a piece of the vomer taken out during the operation on the septum instead of the usual bone graft taken from the ilium

The operation begins with the ordinary submucous resection All the fragments of the quadrangular cartilage are removed, care being taken

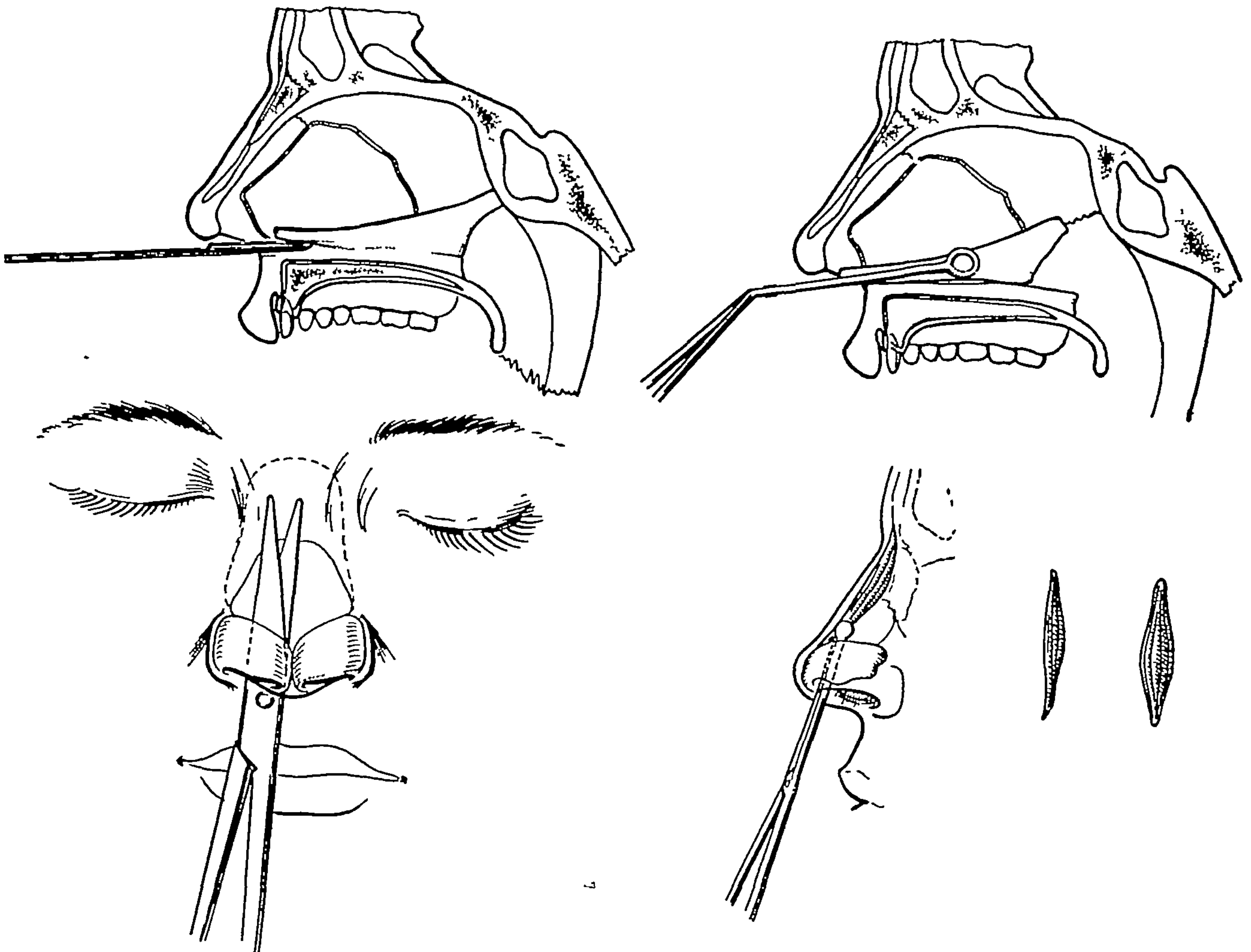


Fig 253



Fig. 259

the following features. first of all it should stay indefinitely in situ and not to be expelled or absorbed by the host. Secondly it should not cause distortion thirdly it must be capable of being shaped as required and finally must be easily obtained (without painful operations)

Inorganic materials have been used for this purpose (ivory amber rubber celluloid etc) metals (gold, silver platinum, aluminium, tantalum, etc) great expectations have been raised by acrilics and lately by polyvinyl sponges (Struthers[3]) But all these substances are in reality foreign bodies and we know as a rule, that they are eliminated in a longer or shorter time.

Many authors have boasted of a series of successes, that is to say their grafts with inorganic materials have remained in situ for many years All this does not prove as they claim, the value of the material used but as Mir y Mir[3] says, the great capacity for endurance which the human organism possesses under certain circumstances Organic substances which might give better results were sought. At first heterologous grafts were tried In 1892 Weir[4] was the first to graft a duck's breast-bone into the nose. The bovine cartilage grafts enjoyed great favor specially after the publication of Gillies s and Kristensen s experiences.[5] The end results were not, however very successful even with these substances Recently North[6] has proved the complete or partial absorption of these kinds of grafts

Homologous grafts were therefore tried and some authors had successful results. Two types of homologous grafts have been used grafts previously treated with chemical or physical agents and fresh grafts. We know that a graft of human tissue is really successful when its cells (or a part of them) survive the transplant Now we can say that every human graft previously submitted to chemical or physical agents killing its cells is destined to be replaced by connective tissue. On the other hand a fresh homograft (with living cells) excites as Fasani says,[7] an immunity reaction of the local or general antigen-antibody type. The host which cannot tolerate a living homograft produces

8 Peer, Lyndon A P R S, 7 12, 1951
9 Stucchi, G F Proceedings of the fifth Internat Congr of O R L Amsterdam, 1953

Une Methode Facile de Greffe Osseuse dans le Cas de Nez en Selle. Gianfranco Stucchi

Un bref compte-rendu de l'auteur sur tous les matériaux utilisés pour la greffe du nez en selle Il rejette tous les corps étrangers de l'organisme y compris les greffes hétérogènes et les greffes conservées parce que toutes comportent un risque d'expulsion et de résorption Les études expérimentales de l'auteur font ressortir que seulsle cartilage et le greffon osseux autogène peuvent donner des succès permanents

Enumération des avantages et des inconvénients de ces deux substances, l'auteur préférant la greffe osseuse quoiqu'il reconnaisse les avantages que présente le cartilage

Dans le but d'éviter l'intervention double c'est-àdire la greffe du nez et l'excision d'os au niveau du tibia ou de l'os iliaque, l'auteur préconise le prélèvement d'un fragment du Vomer pendant qu'on intervient sur le nez Ce greffon a l'avantage de pouvoir être prélevé facilement, d'être façonné sans difficulté et d'avoir de grandes chances de prise Description de la technique de l'auteur

Eine leichte Methode der Einfugung eines Knochens bei einer Sattelnase. Gianfranco Stucchi

Der A gibt einen kurzen Bericht uber alle Materialien, die zur Einpflanzung bei Sattelnasen verwendet wurden Er schlieszt alle korperfremden Stoffe aus, wie heterogene Einpflanzung und alle konservierten Stoffe, weil die grosze Gefahr besteht, dasz viele davon ausgeschieden oder absorbiert werden

Die ausgefuhrten Experimente des A beweisen, dasz nur das autogene Implantat aus Knorpel oder Knochen erfolgreich und von Dauer ist Die Vorteile und die Nachteile dieser zwei Materialien werden angefuhrt

Der A zieht das Knochentransplantat vor, obwohl er die Vorteile des Knorpeltransplantats anerkennt

Um eine doppelte Operation zu vermeiden d h die Einpflanzung in die Nase und die Extirpation eines Rippenoder eines Schienbeinspans, schlagt der A vor, ein Fragment des Vomer, das mittels eines Eingriffs aus der Nase selbst entnommen werden kann, anzuwenden Dieser Span kann leicht entnommen und modelliert werden Der A beschreibt dann die Art seiner Technik

Un Metodo Facil de Injerto Oseo Para la Nariz Aplastada. Gianfranco Stucchi

El autor dá un reporte corto de todos los materiales usados para la corrección de la naríz en silla de montar Descarta todas las substancias extrañas al organismo, incluyendo los injertos heterólogos y preservados porque todos ellos aumentan el riezgo como regla, y terminan reabsorbiéndose o eliminándose Los autores demostraron en trabajos experimentales, que solamente el cartílago o el hueso autógeno tienen éxtio como injertos y son permanentes

Las ventajas y desventajas de estas dos substancias son señaladas El autor prefiere usar el injerto oseo, sin desconocer las ventajas que tiene el cartílago

Para evitar dos tiempos operatorios, por ejemplo, para injerto nasal se tiene que tomar el injerto oseo de la cadera o de la tibia, el autor sugiere el uso de un fragmento de vomer tomado durante la operación en la naríz Este injerto tiene la ventaja de obtenerse facilmente, se modela sencillamente y se integra mejor Se describe la técnica del autor

Discussion

Professor Yrjo Meurman, Helsinki, Finland

A case of monorhinia, a rare congenital malformation, is presented At the first stage, the child being then only 3 years old, a piece of rib cartilage was inserted subcutaneously to elevate the back of the nose At the second stage the ala of the left side was formed with the aid of a tubulated graft from the forehead

Fourteen years later, at the age of 17 years, a nasal canal was formed on the left side The X-ray showed massive bone on the site of the left nasal fossa After an incision was made on the site of the intended nostril the massive bone was bored with a dental burr into a depth more than 2 cm before a communication leading to the epipharynx was found After enlarging the canal a split skin graft sewn around a plastic tube was inserted into it The edges of the skin graft were stitched to the incision for the nostril The dorsum of the nose had previously been elevated once more with a piece of rib cartilage

The author stresses the principle of restoring the function of the organ, which is to be corrected by plastic surgery

Haarfinaminkatu 4E, Helsinki, Finland

Rhinophyma—Surgical Treatment. Ernesto F Malbec, Professor, *Callao 868 3" B, Buenos Aires, Argentina*

In the last several years many patients with rhinophyma have been operated on by us This experience has allowed us to confirm many ideas

to leave only (if possible) a slight strip of framework at the upper part of the nose The mucosa and the periosteum covering the nasal spine and vomer are incised, the periosteum is lifted from the vomer up to the nasal base. With a chisel, starting from the nasal spine, the vomer is separated from the nasal crest of the horizontal part of the palatine bone in an endeavor to produce a single fracture line With either Grunwald or Luc forceps the fragment thus prepared is removed and placed in a basin with physiological saline solution. Then through the intercartilaginous incision (upper and lower lateral cartilage) and by blunt dissection up along the bridge of the nose a channel is formed up to the glabella The periosteum is then lifted and the channel prolonged towards the tip of the nose for a length corresponding to the length of the bone to be grafted. Then the vomer is shaped in order to fill the defect of the bridge and is then slipped into the channel previously formed. Finally the nasal cavity is packed with vaselined penicillin gauze packs and the graft is immobilized with a nasal plaster cast

This method which seems very simple and has given me excellent results has, in my opinion the advantage of avoiding a second operation (to obtain the iliac bone graft or costal cartilage graft) It has besides the advantage of using a nasal bone that according to the above mentioned experiences of Lyndon Peer is one which has the greatest probability of being successful and of resisting infections and distortions better Finally the vomer is easy to shape. This method however may be used only in cases of post-traumatic saddle nose Figures 254 and 255 illustrate two cases treated with this method

REFERENCES

1 King, E. D The Annals of O R. L., 58 577 1919
2 Struthers A. M P R. S., 15-274 1955
3 Mir Y Mir L P R. S., 10 6 1952
4 Weir R N Y M J., 56 449 1892.
5 Gillies and Kristensen B J P S 4 63 1951
6 North J F P R S., 11 201 1953
7 Fasani G M Atti 54 Congr Soc. Ital. Chir Venezia, 1952



FIG. 254. Case No 1 (top) Before treatment. (Bottom) After treatment



FIG 255 Case No 2 (top) Before treatment. (Bottom) After treatment.

8 Peer, Lyndon A P R S, 7 12, 1951
9 Stucchi, G F Proceedings of the fifth Internat Congr of O R L Amsterdam, 1953

Une Methode Facile de Greffe Osseuse dans le Cas de Nez en Selle. GIANFRANCO STUCCHI

Un bref compte-rendu de l'auteur sur tous les matériaux utilisés pour la greffe du nez en selle Il rejette tous les corps étrangers de l'organisme y compris les greffes hétérogènes et les greffes conservées parce que toutes comportent un risque d'expulsion et de résorption Les études expérimentales de l'auteur font ressortir que seulsle cartilage et le greffon osseux autogène peuvent donner des succès permanents

Enumération des avantages et des inconvénients de ces deux substances, l'auteur préférant la greffe osseuse quoiqu'il reconnaisse les avantages que présente le cartilage

Dans le but d'éviter l'intervention double c'est-àdire la greffe du nez et l'excision d'os au niveau du tibia ou de l'os iliaque, l'auteur préconise le prélèvement d'un fragment du Vomer pendant qu'on intervient sur le nez Ce greffon a l'avantage de pouvoir être prélevé facilement, d'être façonné sans difficulté et d'avoir de grandes chances de prise Description de la technique de l'auteur

Eine leichte Methode der Einfugung eines Knochens bei einer Sattelnase. GIANFRANCO STUCCHI

Der A gibt einen kurzen Bericht uber alle Materialien, die zur Einpflanzung bei Sattelnasen verwendet wurden Er schlieszt alle korperfremden Stoffe aus, wie heterogene Einpflanzung und alle konservierten Stoffe, weil die grosze Gefahr besteht, dasz viele davon ausgeschieden oder absorbiert werden

Die ausgefuhrten Experimente des A beweisen, dasz nur das autogene Implantat aus Knorpel oder Knochen erfolgreich und von Dauer ist Die Vorteile und die Nachteile dieser zwei Materialien werden angefuhrt

Der A zieht das Knochentransplantat vor, obwohl er die Vorteile des Knorpeltransplantats anerkennt

Um eine doppelte Operation zu vermeiden d h die Einpflanzung in die Nase und die Extirpation eines Rippenoder eines Schienbeinspans, schlagt der A vor, ein Fragment des Vomer, das mittels eines Eingriffs aus der Nase selbst entnommen werden kann, anzuwenden Dieser Span kann leicht entnommen und modelliert werden Der A beschreibt dann die Art seiner Technik

Un Metodo Facil de Injerto Oseo Para la Nariz Aplastada. GIANFRANCO STUCCHI

El autor dá un reporte corto de todos los materiales usados para la corrección de la nariz en silla de montar Descarta todas las substancias extrañas al organismo, incluyendo los injertos heterólogos y preservados porque todos ellos aumentan el riezgo como regla, y terminan reabsorbiéndose o eliminándose Los autores demostraron en trabajos experimentales, que solamente el cartílago o el hueso autógeno tienen éxtio como injertos y son permanentes

Las ventajas y desventajas de estas dos substancias son señaladas El autor prefiere usar el injerto oseo, sin desconocer las ventajas que tiene el cartílago

Para evitar dos tiempos operatorios, por ejemplo, para injerto nasal se tiene que tomar el injerto oseo de la cadera o de la tibia, el autor sugiere el uso de un fragmento de vomer tomado durante la operación en la naríz Este injerto tiene la ventaja de obtenerse facilmente, se modela sencillamente y se integra mejor Se describe la técnica del autor

---

DISCUSSION

Professor Yrjo Meurman, Helsinki, Finland

A case of monorhinia, a rare congenital malformation, is presented At the first stage, the child being then only 3 years old, a piece of rib cartilage was inserted subcutaneously to elevate the back of the nose At the second stage the ala of the left side was formed with the aid of a tubulated graft from the forehead

Fourteen years later, at the age of 17 years, a nasal canal was formed on the left side The X-ray showed massive bone on the site of the left nasal fossa After an incision was made on the site of the intended nostril the massive bone was bored with a dental burr into a depth more than 2 cm before a communication leading to the epipharynx was found After enlarging the canal a split skin graft sewn around a plastic tube was inserted into it The edges of the skin graft were stitched to the incision for the nostril The dorsum of the nose had previously been elevated once more with a piece of rib cartilage

The author stresses the principle of restoring the function of the organ, which is to be corrected by plastic surgery

Haarfinaminkatu 4E, Helsinki, Finland

Rhinophyma—Surgical Treatment. ERNESTO F MALBEC, Professor, *Callao 868 3" B, Buenos Aires, Argentina*

In the last several years many patients with rhinophyma have been operated on by us This experience has allowed us to confirm many ideas

expressed in former papers It has also been necessary to modify others That is to say that experience, as in all cases, has been of great benefit.

This disease is more frequent in the male than in the female. Of every ten cases only two are females The youngest patient in our series was 26 years old and the eldest, 87 It is therefore a disease of adult life It generally begins around the age of 30 and suffers a progressive evolution until the sixties It therefore, extends over a period of thirty years Although it is commonly observed amongst drinkers many patients have never tasted spirits The first manifestation is acne followed by acne rosacea

In its elephantiasic form, it extends over three quarters of the nasal surface, including skin and cellular tissue. Otherwise in its nodular form it generally appears on the skin of the alae or in the midline that is over the nasal tip Any one of these varieties may assume monstrous proportions as in some of the cases to be shown. When two varieties are found in close association as in the nodular-elephantiasic form, the appearance of the face is a tragic mixture half clown, half monster

What is the result of our experience?

For many years we have abandoned treatment based on chemical substances applied over the surface or injected into the mass of the rhinophyma We believe this treatment is not only incapable of producing any benefit but we consider it endangers normal surrounding tissues

In incipient rhinophymas when they are still in the acne rosacea period, electrofulguration may be of great benefit when the technique of application is well managed. Otherwise the injury produced will give a worse result than the disease. A current of very low intensity must be used, 1 to 1½ miliamperes and milimetric needles employed. Two ways of electrofulguration can be followed. Superficial fulguration of all the surface or coagulation of the blood vessels. With both procedures very good results can be obtained.

We feel that electrofulguration is a simple surgical procedure that should be more generally employed.

Scarification, in incipient rhinophymas has also given us some good results. Nevertheless, we must confess that in many cases other procedures had to be employed in a second operation. This means that we do not recommend it as emphatically as electrofulguration.

Instead of scarification, superficial, minimal decortication may be of great use The surgeon should never forget that the operation must always have a proportional relation to the magnitude of the deformity Therefore, it is not a case of decorticating all noses we see with acne rosacea. Many of these will never develop into rhinophyma Evidently *great experience is necessary* to predict exactly in which cases acne will turn into rhinophyma and which is the best technique to use.

In cases of simple nodular deformities the best thing is excision with a scalpel Although the tumoral growth may be single in some cases accessory nodules appear giving it the aspect of a multinodular formation. In these cases, the nose is totally englobed in a discrete elephantiasis. Multinodular formations without elephantiasic skin are rarely observed Inversely elephantiasic noses without nodular growths are more frequent.

What is our approach in these cases?

In the presence of a nodular-elephantiasic rhinophyma we first excise the nodular growths and second we treat the thickening of the nasal skin Although in our last cases we have preferred simple decortication, not all have been treated in the same manner

As it is known decortication may be superficial medium or deep In accordance with each case one or other has been employed.

In incipient rhinophyma, either nodular-elephantiasic or simple elephantiasic superficial decortication is enough. This is a simple operation *performed* with a common scalpel *or a* thin razor or a small amputation knife. Good results are obtained in fifteen to twenty days when complete epithelization is reached. Medium decortication is indicated in rhinophyma of greater size than those previously considered. Naturally epithelial covering is obtained from twenty to thirty days after operation.

Deep decortication, practically signifies the excision of the whole thickness of nasal skin. Two things may happen here after a long time epithelization may occur in some instances, while in others this will never happen We do not

advise awaiting spontaneous healing In all cases where we have followed this procedure after months or even years the coverage is a thin, transparent, fragile, tender layer of cicatricial tissue No sebaceous nor sudoriparous glands are present, exposing this thin, dry surface to continuous ulceration under the smallest injury Furthermore, the underlying tissue gradually turns into a fibrokeloid scar which not only deforms the skin, but also the osteocartilaginous framework In consequence, every time deep decortication is performed the raw surface must be covered with a thick split skin graft

When is deep decortication indicated?

In all suppurative rhinophymas, where the sebaceous and sudoriparous glands have been turned into cavities full of pus, and where practically all the elements of the skin coverage undergo a chronic inflammatory process We cannot expect this skin to be capable of a good quality of epithelization Here, we advocate ample, deep decortication, treating the lesion as a tumor The remaining raw surface is immediately covered by a skin graft

Besides decortication and other procedures formerly explained, we have employed other types of operation Cross incision of the tumor (Dieffenbach's operation), has been used in two cases We were not satisfied by the results obtained and abandoned the technique There is also a technique described by Grattan which is only a modification of Joseph's operation It can be useful in some cases, applied exactly as described by its author or with a slight modification we have introduced consisting in a prolongation of the transverse incision until it reaches the lateral folds on either side of the nose When this procedure is employed for elephantiasic rhinophymas, all deep tissue must be excised completely leaving only a thin superficial layer This layer is finally sutured over the nose In gigantic rhinophymas, this technique cannot be used because the superficial layer that must be left is of such bad quality as



FIG 256 Case 1 Elephantiasic rhinophyma Treatment Superficial decortication Spontaneous epithelization

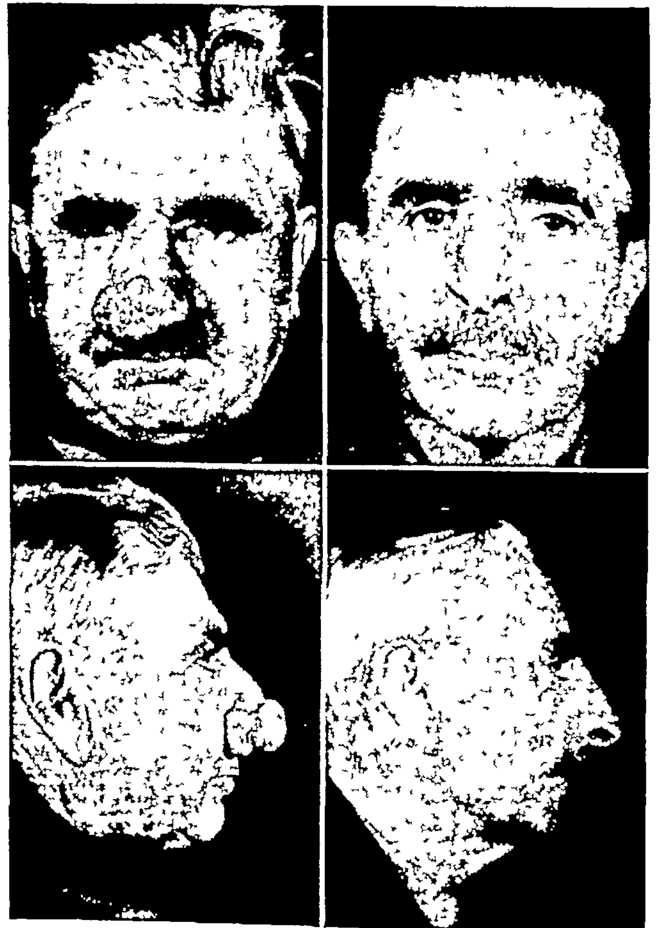


FIG 257 Case 2 Nodular elephantiasic suppurative rhinophyma Treatment Deep decortication Spontaneous epithelization

to undergo sloughing although it has a very good pedicle with excellent blood supply Therefore in monstrous rhinophymas we advise deep decortication followed by immediate skin grafting

Sanvenero Rosselli s operation has very few indications

As a final point we may add that in many instances after radical surgery it is necessary to complete treatment with small electrofulgurations or with X ray applications

The illustrations show eight cases operated according to the various methods discussed.



Fig 259 Tuberous nodular suppurative elephantiasic rhinophyma. Treatment Deep decortication. Healed by epithelization.



Fig 258. Case 3 Elephantiasic rhinophyma. Treatment Grattan operation

Summary

The author has operated upon a great number of cases of rhinophyma in his Department of Plastic Surgery in the Ramos Mejía Hospital of Buenos Aires His present experience confirms the majority of concepts expressed in previous papers on the same subject. Nevertheless some new ideas have displaced former angles of approach.

A list of all the techniques employed for different types of rhinophyma, is mentioned incipient elephantiasic nodular and nodular-elephantiasic forms.

Undoubtedly good results are obtained with decortication when it is superficial or not very deep When it is very deep and the osteocartilaginous framework is exposed spontaneous epithelization is not to be expected. Wolffe Krause or split skin grafts are necessary Otherwise, healing takes months or even years with very unesthetic scars as a final result.

Dieffenbach Grattan Joseph and Sanvenero Rosselli techniques are ultimately discussed and illustrated with cases in which they have been employed.

Ten cases operated upon by the author are presented with photographs of before and after treatment.

Rhinophyma—Traitement Chirurgical. Ernesto F Malbec.

L auteur a opéré un grand nombre de cas de rhinophyma dans son Service de Chirurgie plas-

tique à l'hôspital Ramos Mejia de Buenos Aires Son expérience actuelle confirme la majorité des conceptions qui se sont faites jour dans de précédents articles sur le même sujet Néanmoins quelques idées neuves ont modifié les anciens modes d'abord

On mentionne une liste complète de techniques utilisées pour divers types de rhinophyma rhinophyma à son début, forme éléphantiasique, forme nodulaire et nodulo-éléphantiasique

Il ne faut aucun doute que la décortication quand elle est superficielle ou tout au moins pas très profonde donne de bons résultats Si elle est très profonde et que le chassis épithéliocartilagineux est mis à nu, on ne doit pas s'attendre à une épithélialisation spontanée Il est nécessaire alors d'utiliser des greffes de Wolffe-Krause ou des greffes dermo-épidermiques Si on ne le fait pas, la guérison demandera plusieurs mois si ce n'est plusieurs années avec comme résultat final des cicatrices très inesthétiques On discute enfin les techniques de Dieffenbach, Grattan, Joseph et Sanvanero Rosselli et on les illustre per quelques cas dans lesquels elles ont été mises en application

L'exposé se termine par a présentation de photographie avant et après l'intervention des 10 cas sur lesquels l'auteur a eu à intervenir

Rhinophym—Chirurgische Behandlung. ERNESTO F MALBEC

Der Verfasser hat eine grosse Anzahl von Fallen mit Rhinophym in seiner Abteilung fur plastische Chirurgie in dem Ramos Meja Hospital von Buenos Aires operiert Seine gegenwartigen Erfahrungen bestatigen die Mehrzahl der Anschauungen, die in fruheren Veroffentlichungen uber den gleichen Gegenstand ausgesprochen wurden Immerhin haben einige neue Gedanken fruhere Gesichtspunkte abgelost Eine Aufzahlung der verschiedenen Methoden fur verschiedene Typen von Rhinophym wird gebracht beginnende, elephantiatische, knotenformige und knotenelephantiatische Formen

Zweifellos werden gute Resultate mit der Abschalung erreicht, wennes sich um ein oberflachliches oder nicht sehr tiefes Rhinophym handelt Wenn es sehr tief ist und das Knorpel-Knochengerust frei liegt, kann eine spontane Epithelisierung nicht erwartet werden In einem solchen Falle sind Wolffe-Krause oder Spalthaut-Transplantationen notwendig, sonst nimmt die Heilung Monate oder sogar Jahre in Anspruch und hinterlasst schliesslich sehr unaesthetische Narben

Dieffenbachs, Grattans, Josephs und Sanvenero-Rossellı Techniken werden zum Schluss diskutiert



FIG 260 Tuberous nodular fibrous rhinophyma Treatment Extirpation of the tumor, medium decortication Healed by epithelization



FIG 261 Tuberous nodular suppurative elephantiasic rhinophyma Treatment Extirpation of lesion and application of medium thickness skin graft

und mit Fällen, in denen ihre Operationen angewandt wurden belegt. Zehn Fälle die von dem Verfasser operiert wurden, werden durch Photographien vor und nach der Operation demonstriert.

Rhinofima.—Tratamiento Quirurgico. Ernesto F Malbec.

El autor ha operado un gran numero de casos de rinofima en su Departamento de Cirugía Plástica en el Hospital Ramos Mejía de Buenos Aires Su experiencia presente confirma la mayoría de los conceptos expresados en informes previos sobre el mismo asunto Sin embargo algunas nuevas ideas han desplazado antiguos puntos de vista.

Se menciona una lista de todas las técnicas empleadas para los diferentes tipos de rinofima incipiente elefantiásica nodular y nodular elefantiásica

Indudablemente se obtienen buenos resultados con la decorticación cuando es superficial o no muy profunda. Cuando es muy profunda y el tejido osteocartilaginoso queda expuesto generalmente la epitelización espontánea no se presenta. En este caso se aplicarán injertos intermedios, de lo contrario la cicatrización requiere meses o aun años dejando como resultado cicatrices poco estéticas

Dieffenbach Grattan, Joseph y Sanvenero Rosselli han creado técnicas para la corrección del rinofima se discuten y se ilustran con casos que han sido operados.

El autor muestra diez casos operados con fotografías pre y post operatorias.



Fig. 262 Multinodular suppurative elephantiasic rhinophyma Treatment Extirpation, & application of ¾ thickness skin graft.



Fig. 263 Nodular suppurative elephantiasic rhinophyma. Treatment Extirpation of the tumor Repair by bipedicled skin flaps, according to technique of Sanvenero Rosselli.

V

EYE

Temporalis Muscle Transplants for Defects Following Orbital Exenteration. JEROME P WEBSTER, M D, *The Division of Plastic Surgery, Department of Surgery, Presbyterian Hospital and College of Physicians and Surgeons, Columbia University, New York*

When a muscle is transplanted, it is usually divided at its point of insertion and the freed end is re-attached elsewhere to provide a dynamic force where this is lacking Thus in facial paralysis the tendon of the temporalis muscle may be released from its insertion on the mandible and attached to fascial strips to activate the mouth[1–4] Much less often is the fixed end of a muscle, or a portion of it, freed from its origin to obtain motion by transfer of that end[5] Even more rarely is a muscle transplanted for the purpose of using its bulk and vascular qualities instead of its potential dynamic action Such use of muscles might well be made more frequently

A careful survey of the literature has failed to reveal but few instances in which the temporalis muscle was used to fill a defect made by orbital exenteration,[6,7,8] with or without periorbital excision Two cases are here reported in which the entire temporalis muscle, freed from its origin, and with its blood supply, innervation, and insertion on the coronoid process of the mandible intact, was swung forward and transplanted to fill such a defect The method was briefly mentioned by the author in 1944 with photographs of the first of these two patients[9]

Exenteration of the orbit, which was first described by George Bartisch[10] in 1583, is a procedure in which the entire contents of the orbit, usually including the periosteum, is removed for a malignant neoplasm which so threatens the orbital contents or life itself that it is not safe to attempt to save these structures Such tumors may arise within the orbital cavity, from the adjacent skin, accessory sinuses, or cranium, so as to involve the structures of the orbit irreparably[11]

For the adequate removal of malignant neoplasms, or the so-called benign neoplasms such as mixed tumors of the lacrimal gland which may recur if not completely removed, it may be essential at times to remove a portion of the bony orbital wall, to make openings into adjacent structures, such as the oral or nasal cavities and accessory air passages, or even through the dura if this is involved by the malignant process

Until fairly recently, after orbital exenteration, the cavity was left to granulate and to cover over gradually with skin and mucous membrane Dr John M Wheeler[12] mentioned in 1915 that if the operator chose he might hasten healing by laying Thiersch grafts on the granulation tissue that forms In 1922 he also said[13] "It is not necessary for the surgeon to wait for granulation tissue formation He can graft epidermis immediately after removing the orbital contents, with assurance of success Epidermis will 'take' on bone, as well as on muscle, tendon, fascia and periosteum " Such immediate skin grafting after exenteration has become the approved procedure

This immediate coverage of the bony wall of the orbital cavity with skin has greatly speeded up healing, prevented osteomyelitis and abscess formation, and through this thin covering has also permitted observation of the cavity for possible reappearance of neoplastic growth Such a thin epithelial covering, however, may sometimes break down and ulcerate and become a protracted dressing problem

At best an unsightly cavity, suggestive of a skull, results from complete orbital exenteration yet it is certainly inadvisable subsequently to attempt by plastic operations to reconstruct a socket for the reception of an artificial eye. It is our feeling that an eye patch or spectacles with an opaque glass lens and a lateral shield on the affected side is far preferable to any such attempted reconstruction or even to a prosthesis containing an immobile artificial eye.

The depth of the cavity left after exenteration may be reduced and the appearance of the cavity made less ugly if flaps of skin and fat are advanced or rotated from the forehead, temporal region or cheek or if pedicle flaps are brought in from the neck chest or arm [14-17] One operator has even brought in hairy scalp flaps to cover the orbital cavity [18] Flap coverage may perhaps be more safely done as a secondary procedure after adequate time has elapsed to preclude the possibility of further reappearance of the tumor

It is surprising that the temporalis muscle, a very vascular structure adjacent to the orbit, has apparently been largely overlooked as a valuable aid to reduce the size of the orbital cavity following exenteration and to cover bony openings made after wider periorbital excision.

Operative Procedure

With an approach at the anterior border of the temporalis fascia, the temporalis muscle is readily freed from the overlying fascia with blunt curved scissors The scissors are then reintroduced anterior to the vertical temporalis muscle fibres and are passed under the muscle to sever it from its bony attachment at its periphery Only slight bleeding occurs and this is readily stopped by pressure No incision in the scalp is required.

Cases

The following two cases illustrate this use of the temporalis muscle.

Case 1 [This case was reported briefly in 1931 by the late Dr Daniel B Kirby [19] with a report of the pathological findings by Dr Virginia Kneeland Frantz and in 1944 by the author [9]]

A A.S P H 282270 White widow aged 55 when on January 8 1934 she was referred to the author for treatment.

Three years earlier on February 3 1931 the patient was first admitted to the Institute of Ophthalmology of the Presbyterian Hospital with a 31 year history beginning when aged 21 with a small wart that appeared on her left lower eyelid in 1900 The lesion ran a variable course responding temporarily to cautery X-ray and radium therapy Kromeyer lights, and surgery In 1928 three years before admission, the lesion involved the entire lower lid and extended to the rim of the left ala nasi. The involved lower lid and cheek were cut away with a cautery knife by a dermatologist. Subsequently a plastic surgeon, now deceased repaired the lid by the use of free grafts which were taken from both upper eyelids the inside of the arm and from the lower lip as a mucous membrane graft. The condition persisted, the lids grew together and the patient lost the use of the eye and had a purulent discharge from a nearly closed palpebral fissure (Fig 264 top left) She also was troubled with large varicose veins of both legs.

On February 6 1931 an exenteration of the left orbit was performed by Dr Kirby with the removal of the orbital periosteum and with the bare bone immediately covered by an epithelial graft from the thigh. On three subsequent admissions Dr Kirby excised local recurrences of the tumor about the orbital margin and cheek and applied free skin grafts The surgical pathological diagnosis was basal-squamous cell epithelioma.

When the patient was referred to the author on January 8 1934 (Fig 264 top right) there were evidences of tumor about the lateral, medial and inferior borders of the orbital cavity involving both the inside and outside surfaces. At operation on March 7 1934 incision was made (Fig 264 bottom left) through the soft tissues from the outer border of the supraorbital ridge over the zygomatic arch and cheek to the upper lip below the left ala nasi, around the left ala and left side of the nose to the inner side of the eyebrow A second circular incision was made inside of the first, within the orbital cavity so as to leave intact an island of skin graft in the upper outer quadrant of the orbit

The outer portion of the bony supra-orbital ridge was removed with the lateral bony wall of the orbit, with section through the zygomatic

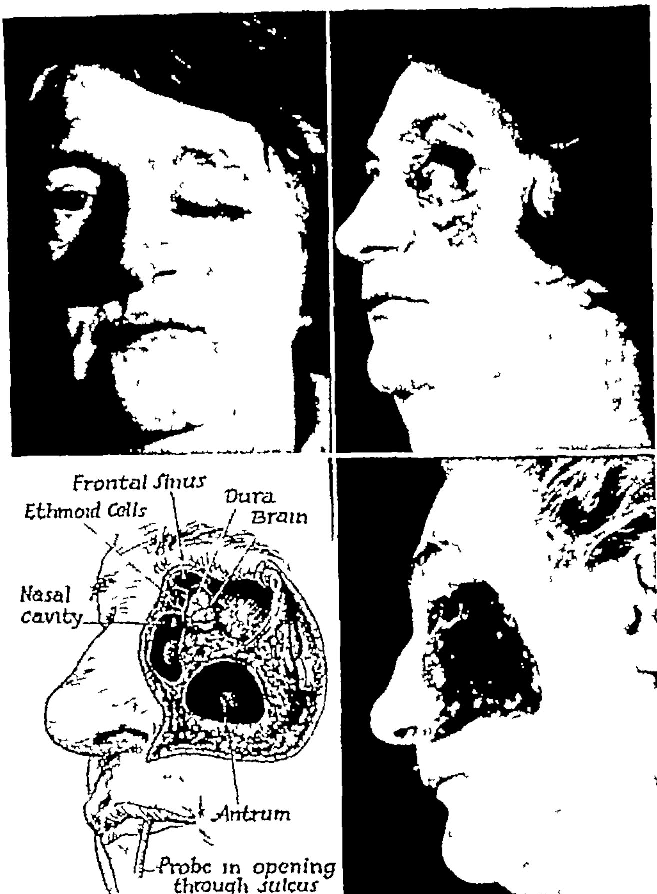


FIG 264 (top left) Case 1 Condition February 4, 1931 before exenteration This shows a narrowed palpebral fissure with epithelioma of the conjunctiva, lower eyelid and cheek (Top right) Condition January 8, 1934 when referred to the author after exenteration and three operations for excision of epitheliomata with skin grafts Note intra-orbital and extra-orbital involvement (Bottom left) Drawing of area of excision (March 7, 1934) of periorbital tissue showing various openings into adjacent cavities Note the opening through the dura (Bottom right) Condition March 17, 1934 on the 9th postoperative day, showing temporalis muscle brought in to close all openings except that to the nasal passage

process and the zygomatic bone, and removal of the upper and anterior walls of the maxillary antrum, the lateral nasal wall, floor of the frontal sinus and the lateral wall of the ethmoid cells This resulted in openings into the maxillary antrum, the mouth at the upper sulcus, the nasal cavity, the left frontal sinus, and the ethmoid cells An opening was made in the dura above the orbital roof when attempting to remove the specimen *en bloc* Through this opening cerebro-spinal fluid escaped

Faced with the problem of closing over this opening, and attempting to avoid meningitis from the various potentially contaminated cavity openings (before the advent of the sulpha drugs and the antibiotics), a sponge was held over the opening in the dura, while the fistula to the mouth was closed with sutures, and the entire left temporalis muscle was quickly freed from its attachment to the temporalis fascia and to the temporal ridge of the skull, and was then swung in to fill the orbital cavity By sutures from the muscle edge to periosteum and soft tissue, the hole in the dura and all those openings except that into the nasal passage could be closed A fine mesh xeroform gauze and a voluminous dressing were applied, and the patient's head was maintained at a lowered position for 24 hours While severe headaches persisted for a few days with the marked loss of cerebrospinal fluid, there were no definite signs of meningitis The temporalis muscle was extremely vascular and rapidly formed a satisfactory granulation tissue covering (Fig 264, bottom right)

On March 27, 1937, under general anesthesia, a large split skin graft was removed from the lateral femoral region and was refrigerated[17] A flap of skin and subcutaneous tissue was turned down from the left side of the nose, and a flap of muscle was brought over this and sutured to close the nasal fistula (Fig 265, left) A crescent-shaped portion of the temporalis muscle which bridged across the orbital cavity was excised to give better access for cleansing the skin graft on the upper lateral wall of the cavity Nine days later, at ward rounds (Fig 265, center) the refrigerated skin graft was laid over the fine velvety granulation tissue that had formed on the muscle, and this graft took 100 per cent (Fig 265, right) There was never any complaint of abnormal motion, discomfort or annoyance due to the forward position of the temporalis muscle

Inasmuch as the left side of the mouth was drawn up and there was marked hollowing of the left cheek, a pedicle flap from the neck was subsequently brought up in two stages to fill this defect (Fig 266) The patient wore spectacles with a ground glass lens and a large side shield on the left (Figs 267, left and center)

Subsequently a mass appeared about the lobe of the left ear which proved on biopsy to be basal cell epithelioma This was successfully held in check when treated by X-ray irradiation with 5000 roentgens There was an occasional

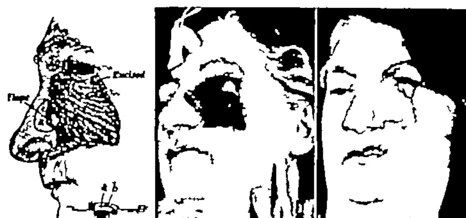


FIG 265 (left) Case 1 Drawing to show operative steps made March 27 1934 with closure of fistula to the nose by overlapping flaps and the excision of a portion of temporalis muscle to give access to the orbital wall skin graft A split skin graft was also removed and refrigerated. (Center) Condition April 3 1934. Velvety granulations upon which the split skin graft, refrigerated 9 days, was applied. (Right) Condition May 14 1934 showing areas covered Contraction, however has elevated the left side of the upper lip

opening to the frontal sinus which subsequently closed, and a definite tumor appeared in the left lateral orbital region (Fig 267 right) This area with surrounding bone was excised April 24 1941 and was covered over with adjacent skin flaps and by reflecting a portion of the temporalis muscle as a flap A type 3 pneumococcus pneumonia developed in the right lower pulmonary lobe which subsided. The patient developed tenderness over the great saphenous vein and on May 20 1941 she was found dead in the bathroom with a large saddle pulmonary embolus from the right femoral and great saphenous veins.

Case 2 [This patient is included in the report of Dr Ira S Jones and Dr Raymond L Pfeiffer [20] (C Z., Table 1 p 842 Fig. 1 p 843) and also in the report of Dr Arnold W Forrest [21] (C S., Table 1 p 858) These papers were both presented at the Fifty Eighth Annual Session of the American Academy of Ophthalmology and Otolaryngology October 11 16 1953 Chicago Ill]

C A Z P H. 144789 Single white female, aged 26 On February 7 1953 this patient consulted an ophthalmologist because of protrusion of the left eye which had been present for three years with no recent change. There was double vision on looking to the left Visual acuity 20/15 in both eyes with correction. The right fissure 7 mm left 8 mm The left eye was 6 mm lower than the right. Exophthalmometer reading at 95—O.D 15 mm O.S 19 mm The mus-

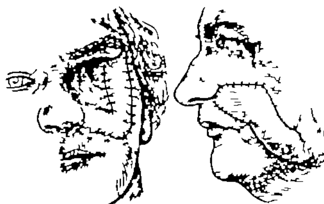


FIG. 266 (left) Case 1 Drawing of operation performed January 29 1936 shifting a pedicle flap from the neck to the cheek. (Right) Drawing of operation February 19 1936 after division of the pedicle flap



FIG 267 (left) Case 1 Condition April 18 1940 with the cheek area filled out and the mouth brought down to a normal level (Center) Showing patient with spectacles having a ground glass lens and a side shield (Right) Condition February 21 1941 showing tumor growth in upper outer quadrant of the orbital wall.

cles showed some limitation of abduction O S and of the left superior rectus Three degree binocular vision on stereoscope The globe was grossly proptosed, was not replaceable, and did not pulsate A hard, firm, rounded mass was palpable in the upper temporal quadrant, with no bruit With the pupils dilated, the right fundus was normal In the left eye striate pressure lines curved between and above the disc and macula The X-ray showed an enlarged lacrimal gland fossa (Fig 268, top left) A diagnosis was made of tumor of the lacrimal gland, probably of the mixed cell variety

At operation by the ophthalmologist on March 2, 1953, a lateral canthotomy was made and the incision extended posteriorly Through a Kronlein approach a tumor of the lacrimal gland about 2 x 1½ x 1½ cm was found It was friable, not encapsulated, and could not be removed in one piece Some of the tumor tissue extended far back to the posterior part of the orbit All the tumor that could be felt was removed, including both lacrimal glands

The specimen was pronounced by various specialists to be a mixed tumor of the lacrimal gland, although one thought "some areas of solid sheets of tumor cells have a very malignant appearance" It invaded periosteum (Fig 268, right) All felt that exenteration was required



Fig 268 (top left) Case 2 Roentgenogram taken February 10, 1953, showing large lacrimal gland fossa at arrow, with the bone cortex intact, indicative of a mixed tumor (Right) Mixed tumor of the lacrimal gland found at exploratory operation March 2, 1953, showing invasion of the periosteum by the tumor (Bottom left) Condition of patient June 15, 1953 after canthotomy and modified Kronlein operation, showing scar of the operation

The patient was first seen by the author on June 15, 1953, at which time (Fig 268, bottom left) the left globe was slightly more prominent and below the level of the normal right eye There was a slight fullness of the outer portion of the left lower eyelid with a dilated vein and a red, slightly raised scar extending downward and outward from the external canthus toward the zygomatic arch No abnormal mass could be felt in the region of the lacrimal gland

At operation under general anesthesia, June 30, 1953, a split skin graft was removed from the left lower quadrant of the abdomen The lid margins were sutured together with a continuous suture An elliptical incision (Fig 269A) was made through the upper and lower lids so as to surround both the canthi and the scar resulting from the previous operation (Fig 269B) Incision was carried through the periosteum around the medial and inferior orbital margins and the periosteum was stripped away from the bone of the orbital cavity with a periosteal elevator, except in the upper lateral portion of the orbital cavity Here the tissues were retracted upwards and laterally over the orbital ridge, and the periosteum was incised and stripped away well beyond and above the supra-orbital margin

With a perforator and burr, an opening was made through the frontal bone above the middle of the supra-orbital margin Here the burr went through into the lateral portion of the left frontal sinus but did not perforate the mucoperiosteum Another burr hole was made at the left linea temporalis of the frontal bone, and a third opening of the bone was made in the fossa temporalis at the left sutura sphenozygomatica The dura was stripped away from under the bone connecting these holes and the bone was cut away between the holes with a de Vilbiss rongeur The dura was freed from the bone in the frontal fossa and the bone overlying the roof of the orbit was cut through The zygomatic process of the temporal bone was cut through as was the zygomatic bone and latero-inferior orbital wall to the inferior orbital fissure After severing the optic nerve the entire contents of the orbital cavity, together with the major portion of the orbital surfaces of the frontal, sphenoidal and zygomatic bones, was removed *en*

bloc (Fig 269C) This exposed a wide area of dura covering the cerebral frontal lobe and avoided any possible dangerous contact with the lacrimal fossa and the previous operative field.

In order to help fill the deep orbital cavity to cover the exposed dura, and to close the wound, the main body of the temporalis muscle was easily released from its fascial and bony origin, and this freed end was swung forward into the orbital cavity (Fig 269D) It was sutured everywhere to the periosteum and soft tissue surrounding the bony walls The remnants of the eyelids were replaced and sutured to the temporalis muscle (Fig 269E) and the split skin graft previously removed was cut to fit the defect. It was sutured edge to edge with 3 point sutures (Fig 269F) and with the long ends tied over a bolus dressing The skin graft took satisfactorily and the patient was discharged 15 days after operation.

Examination of the specimen showed that the bony orbital wall removed with the specimen measured 6 x 4 cm in its superior part and 3 x 1 cm in the inferior lateral part. On opening the upper fornix of the conjunctival sac a firm white tumor mass was seen attached to the bone. This measured 3 x 2 x 1 cm. Microscopic examination revealed well defined areas of lacrimal gland tissue in a loose connective tissue surrounded by dense fibrous tissue with irregular foci of lymphocytes In two well defined areas the acinar arrangement of the cells had completely disappeared, forming irregular sheets with a matrix of pale bluish staining myxomatous material between the cells No invasion of the bony orbit by the tumor was found The diagnosis was mixed tumor of the lacrimal gland recurrent

In the two years since operation the patient has not complained about any difficulty with the muscle transplanted into a forward position When particularly asked, she stated that there was a "cracking sound in front of her left ear but that this was present and as marked before

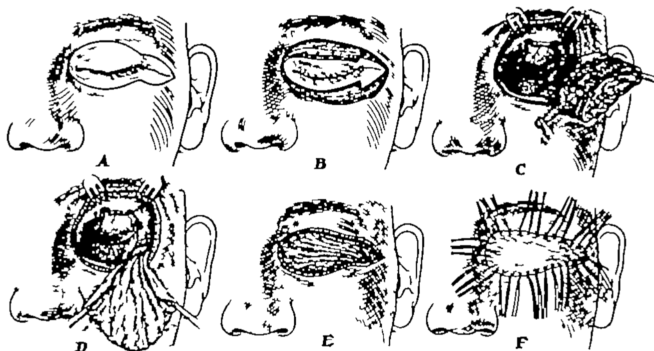


FIG. 269 Case 2. Drawings to show the operation of June 30 1953 (A) Outline of incision surrounding the orbital aperture and the scar of the previous operation. (B) The lip ends sutured and the incision carried through the orbicularis oculi. (C) The dura of the frontal lobe has been exposed by an approach through the bone of the supra-orbital and temporal fossa regions, and the orbital contents exenterated with removal of the upper lateral bony walls of the orbit and without entering the field of the previous operation. (D) The fixed portion of the temporalis muscle has been freed from its bony and temporo-fascial origin to fill out the orbital cavity and cover the exposed area. (E) After suturing the muscle everywhere about the orbital cavity the eyelids are re-positioned and sutured to the muscle. (F) The split skin graft, fitted to pattern is sutured everywhere to the muscle and to the skin edges surrounding the defect with 3 point sutures, and the ends are left long to tie over a bolus type of dressing

her operation as at the present time There has been a slight hollowing in the left temporal region and a flattening of the outer portion of the supra-orbital ridge (Fig 270, left) Through the thin skin graft the temporalis muscle can be seen contracting when the patient bites down While in repose a pulsation can be made out in the region of the frontal lobe from which the bone had been removed The operative site is protected by spectacles with a smoked glass lens and a molded side shield (Fig 270, center) There has been no sign of reappearance two years after operation, and the roentgenograms show no erosion of the bone (Fig 270, right)

Discussion

In Case 1, the temporalis muscle was readily mobilized from its origin and furnished a satisfactory seal to the hole in the dura This undoubtedly prevented meningitis and served as a life-saving procedure To have dura left exposed to the outside would have been dangerous even if it were intact, for a coverage of some type was needed With a hole through the dura, and a possible contamination from the mouth, nose and accessory air passages, a wall vascularized soft tissue covering was required to seal over the opening Ideally it might perhaps have been better to have covered all raw areas with a split skin graft to facilitate observation for tumor reappearance, but the hole through the dura demanded immediate coverage with an active vascularized flap rather than a passive free graft, even though persistent tumor might thereby be masked A free skin graft would not have sufficed as it undoubtedly would not have survived over the opening, and necrosis would have been fatal

An adjacent pedicle flap of skin and fat, or one taken from a distance, might have been used Such a procedure would have been more time consuming, more deforming, and more precarious An inadequate blood supply to such a flap would have been disastrous

Here in the adjacent temporalis muscle was a structure with excellent vascularity that covered not only the dural tear, but also the openings to the accessory air passages and a part of the fistula to the nose The blood supply to the muscle was so excellent that bright red granulations sprang up in a short time and, when the fistula to the nose was closed by flaps, made an excellent recipient bed for the refrigerated skin graft

With the second case there might be criticism that too radical a procedure was used for a so-called benign mixed tumor of the lacrimal gland However, the record of reappearance of these tumors after operation is so distressing that only by radical procedures can a cure be surely ob-



Fig 270 (left) Case 2 Condition May 25, 1955, nearly two years after exenteration, showing the comparatively slight orbital deformity but some depression in the temporal region and at the outer supra-orbital area (Center) Condition May 25, 1955, showing the patient wearing spectacles with a dark lens and a lateral shield to cover the deformity (Right) Roentgenogram taken May 25, 1955, showing the bony defect following operation, with no sign of hyperostosis or erosion of the bone

bloc (Fig 269C) This exposed a wide area of dura covering the cerebral frontal lobe and avoided any possible dangerous contact with the lacrimal fossa and the previous operative field.

In order to help fill the deep orbital cavity to cover the exposed dura and to close the wound, the main body of the temporalis muscle was easily released from its fascial and bony origin and this freed end was swung forward into the orbital cavity (Fig 269D) It was sutured everywhere to the periosteum and soft tissue surrounding the bony walls The remnants of the eyelids were replaced and sutured to the temporalis muscle (Fig 269E) and the split skin graft previously removed was cut to fit the defect. It was sutured edge to edge with 3 point sutures (Fig 269F) and with the long ends tied over a bolus dressing The skin graft took satisfactorily and the patient was discharged 15 days after operation.

Examination of the specimen showed that the bony orbital wall removed with the specimen measured 6 x 4 cm in its superior part and 3 x 1 cm in the inferior lateral part. On opening the upper fornix of the conjunctival sac, a firm white tumor mass was seen attached to the bone. This measured 3 x 2 x 1 cm Microscopic examination revealed well defined areas of lacrimal gland tissue in a loose connective tissue surrounded by dense fibrous tissue with irregular foci of lymphocytes In two well defined areas the acinar arrangement of the cells had completely disappeared forming irregular sheets, with a matrix of pale bluish staining myxomatous material between the cells No invasion of the bony orbit by the tumor was found. The diagnosis was mixed tumor of the lacrimal gland recurrent

In the two years since operation the patient has not complained about any difficulty with the muscle transplanted into a forward position. When particularly asked, she stated that there was a "cracking sound" in front of her left ear but that this was present and as marked before

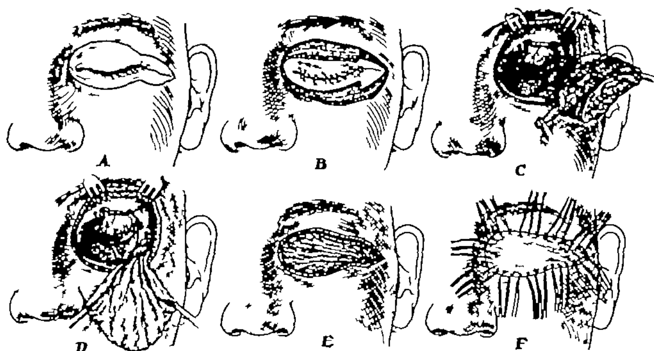


Fig 269 Case 2 Drawings to show the operation of June 30 1953 (A) Outline of incision surrounding the orbital aperture and the scar of the previous operation (B) The lip ends sutured and the incision carried through the orbicularis oculi. (C) The dura of the frontal lobe has been exposed by an approach through the bone of the supra-orbital and temporal fossa regions, and the orbital contents exenterated with removal of the upper lateral bony walls of the orbit and without entering the field of the previous operation (D) The fixed portion of the temporalis muscle has been freed from its bony and temporo-fascial origin to fill out the orbital cavity and cover the exposed area (E) After suturing the muscle everywhere about the orbital cavity the eyelids are re-positioned and sutured to the muscle (F) The split skin graft, fitted to pattern is sutured everywhere to the muscle and to the skin edges surrounding the defect with 3 point sutures, and the ends are left long to tie over a bolus type of dressing

REFERENCES

1 Grundt, B Surgical treatment of seventh nerve paralysis Brit J Plas Surg, 3 50-55, April 1950
2 McLaughlin, C R Permanent facial paralysis The role of surgical support Lancet, 2 647-651, Sept 27, 1952
3 Battle, R J V A technique for reanimation of the face after paralysis of the seventh nerve Brit J Plas Surg, 5 247-252, Jan 1953
4 Harris, Harold I Evaluation of the various techniques for the surgical treatment of facial paralysis Plast & Recons Surg, 13 193-203, March 1954
5 Gillies, Sir Harold Experiences with fascia lata grafts in the operative treatment of facial paralysis Proc Roy Soc Med, 27 (Section of Otology and Section of Laryngology, 98-104), August 1934, Figs 1 & 3
6 Campbell, H Hoyle Reconstruction of the left maxilla Plast & Reconstruct Surg, 3 66-72, 1948
7 Campbell, H Hoyle Surgery of lesions of the upper face Amer Jour Surg, 87 676-687, May 1954
8 Naquin, Howard A Personal communication, March 24, 1955, regarding a paper presented at a Residents' meeting at the Wilmer Institute of Ophthalmology, Johns Hopkins Hospital, on April 1, 1954, now in preparation for publication, in which Dr Naquin described his use of an anterior portion of the temporalis muscle approached through a scalp incision and brought through an opening in the lateral wall of the orbit following a Kronlein procedure
9 Webster, Jerome P Refrigerated skin grafts Ann Surg, 120 431-449, Oct 1944
10 Bartisch, George Ophthalmodoulia, das ist Augendienst Dresden, 1583, Pt XI, Chap 3, p 217.
11 Naquin, Howard A Exenteration of the orbit Arch Ophthal, 51 850-862, June 1954
12 Wheeler, John M Operations on the orbit *In* Johnson, A B Operative therapeusis New York, Appleton, 1915, Vol 3, p 90 *Also in* Collected papers of John Martin Wheeler, M D, New York, 1939, p 80
13 Wheeler, John M The use of the epidermic graft in plastic eye surgery Internat Clin, 3 293-294, 1922 *Also in* Collected papers of John Martin Wheeler, M D, New York, 1939, pp 164-165
14 Davis, John Staige Plastic surgery Its principles and practice Philadelphia, Blakiston's Sons, 1919, 381-383
15 Blair, Vilray P, Brown, James Barrett, and Hamm, William G Types of reconstructive surgery of the orbital region South Surgeon, 1 293-300, Jan 1933
16 Marcks, Kerwin M Repair of defects pro-

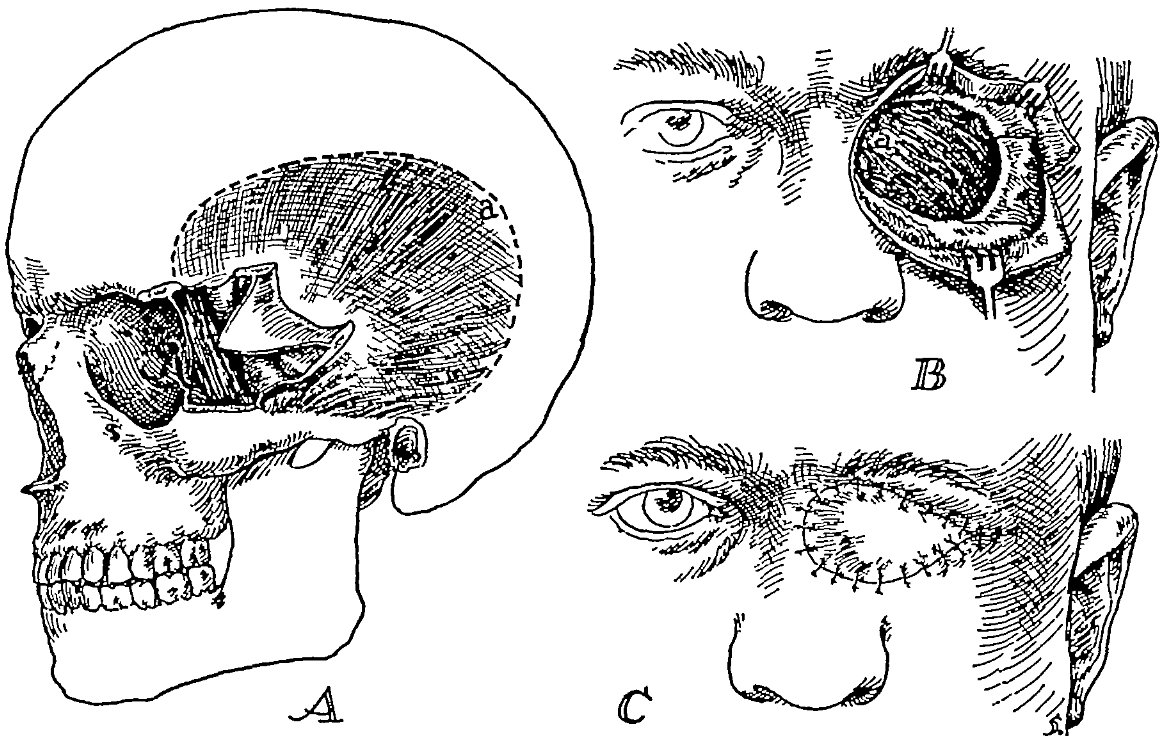


FIG 271 Schematic drawing showing how the temporalis muscle could be transplanted to fill the orbital cavity and to maintain the lateral orbital margin without leaving a depression (A) The temporo-zygomatic process forming the orbital margin, together with the lateral orbital wall, is freed and reflected back on the temporalis fascia (B) The temporalis muscle is swung forward to fill the cavity and the orbital margin replaced after excision of the lateral orbital wall (C) Closure with split skin graft

tained.[21, 23–24, 27–29] In this particular instance a radical procedure was especially indicated because the tumor had broken through its capsule and involved the periosteum, and there was a delay of 12 weeks between the original exploratory operation and the exenteration with removal of the upper lateral bony wall of the orbit

The operative approach to the frontal fossa of the cerebrum was most satisfactory and a search of the literature has failed to disclose any similar method of approach The transcranial approach[30–36] seems unnecessarily radical for removal of the bony roof and lateral wall of the orbit for excision of mixed tumors of the lacrimal gland without evidence of bony erosion Reese[34, p. 553] believes that "the approach to the orbit through the roof for the removal of orbital lesions is not a measure to be employed in the usual case of orbital neoplasm. Modifications of the Krönlein operation have also been used.[37–39]

It was considered at operation that the radical procedure performed would definitely obviate reappearance of the tumor and now two years after operation, this opinion seems justified with no symptoms and no erosion or thickening of bone, indicative of reappearance

One might have closed over the raw area of the operative wound with a free skin graft which would have taken satisfactorily on the dura, and thus permitted observation of the area for any reappearance. However with such an improbability after so radical a procedure, this precaution and added operative step did not seem indicated. The muscle transplant not only helped to reduce the depth of the unsightly cavity but gave added protection to the bulging dura and furnished bulk for partial replacement of the supra-orbital ridge This transplantation was of course at the expense of a slight hollowing of the temporal region This is not actually so much as might be expected because of the drum-like temporal fascia covering this fossa, and such a depression could be largely camouflaged in a woman by covering the area with hair

In more malignant tumors, and particularly where periorbital resection must be added to orbital exenteration, it might be advisable to cover over the raw areas primarily with a skin graft for ready inspection for tumor reappearance If reappearance occurred this graft could later be excised and the temporalis muscle brought in secondarily to help fill the depression, cover over exposed cavities and be grafted with a split skin graft in a simple procedure and without additional deformity

It might be possible in certain instances to reflect the lateral bony orbital wall with its attachment to the temporal fascia in a modified Krönlein operation (Fig 271) to excise the thin temporal portion of the orbital wall to transplant the temporalis muscle into the orbital cavity after exenteration and to replace the fronto-zygomatic rim in order to improve the contour Or the thin lateral bony wall might be resected medial to the orbital rim and the muscle brought through this opening in the bone.

The temporalis muscle when reflected into the orbital cavity was so vascular that it readily nourished the free skin graft applied in its new position and permitted the coverage of all raw areas at a single operation, as well as giving an improved appearance.

In neither case was there the slightest complaint of discomfort resulting from the change of position of the muscle. There was no tendency for the jaw to be pulled forward, and the action of the mandible during mastication was normal. Muscle action could be observed in both cases on biting down, but this was hidden by the ground glass lenses and wide shields molded to fit the facial structures in both cases

Summary

Two cases are reported illustrating a rare use of the temporalis muscle In each instance this muscle was freed from its origin swung forward and transplanted to help fill the orbital cavity following exenteration and periorbital excision In one case it was used as a life-saving measure to seal off an opening in the exposed meninges as well as to close holes in the accessory air passages. In the second case the muscle lessened the depth of the orbital cavity and so reduced the deformity It also helped to support the dura where its bony floor was removed. In both instances the transplanted muscle formed an excellent bed for immediate or secondary coverage with split skin grafts, improved the appearance with minimal operative steps and caused no discomfort after transplantation.

In dem 2 Fall vermindert der Muskel die Tiefe der Orbitalhohle und damit auch die Deformitat Er half auch die Dura dort abzustutzen, wo ihr knocherner Boden entfernt worden war

In beiden Fallen bildete der transplantierte Muskel ein ausgezeichnetes Bett fur die sofortige oder sekundare Deckung mit Spalthautlappen, verbesserte das Aussehen mit einem Minimum an operativem Aufwand und verursachte keine Beschwerden nach der Transplantation

Transplantes de Musculo Temporal para Defectos Consecutivos a la Exenteración de la Orbita. Jerome P Webster

Se reportan dos casos para ilustrar un uso raro del músculo temporal En cada uno, el músculo fue liberado de su origen, llevandolo hacia adelante y transplantándolo para ayudar a llenar la cavidad orbitaria despues de la exanteración y escisión periorbitaria En un caso fue usado como medida salvavida para sellar una abertura en las meninges que estaban expuestas, asi como para cerrar perforaciones en los pasajes aéreos accesorios

En el segundo caso, el músculo disminuyó la profundidad de la cavidad orbitaria, reduciendo tambien la deformidad Tambien ayudó a sostener la duramadre, al tener que resecarse el piso óseo de sostén En ambos casos el músculo transplantado formó un excelente lecho para la cubierta inmediata o secundaria con injertos de piel de medio espesor, mejorando la apariencia con un mínimo de pasos operatorios sin causar molestias despues del transplante

---

An Attempt to Re-establish Lachrymal Drainage. Preliminary Report.

Halfdan Schjelderup, *Nesttun nr, Bergen, Norway*

Stenosis of the lachrymal drainage apparatus at any level is not an infrequent condition encountered in plastic surgery The cause of stenosis may be traumatic in connection with fractures of the nasal compound, lacerations or burns of the eye lids, inflammatory lesions of the lachrymal sac, tumors, and finally congenital absence of the whole drainage system

Various methods have been employed to overcome the condition and thereby rid the patient of the cumbersome epiphora with subsequent eczematous changes of the skin below the affected eye It seems to be generally accepted that none of these methods is capable of maintaining a patent drainage in all cases

The author has tried the following method on five eyes In two the stenosis was of traumatic origin and in three there was congenital absence of the whole draining apparatus The latter cases were in two brothers, one of whom had unilateral and the other bilateral absence of the whole drainage apparatus

Principle

The principle consists of

1 Establishing a communication between the conjunctival sac and the nasal cavity

2 Securing the patency of the new passage by pulling a strip of conjunctiva down and sewing it to a "meeting-flap" of nasal mucosa

3 This epithelial bridge will subsequently tube itself in the same way as the epithelial bridge in the *Denis Browne* operation for hypospadias

Operation

All operations have been carried out under general anaesthesia Procain with adrenalin has been injected locally for the sake of haemostasis

As indicated on the diagram (Fig 272A) two incisions are made One medially in the conjunctival sac and the other in the region where the lachrymal sac should be The latter incision

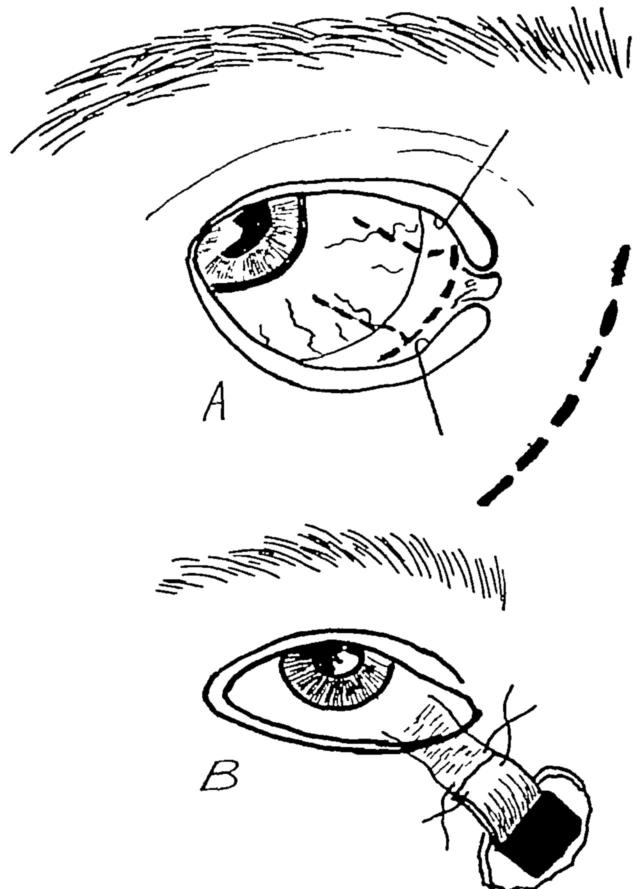


Fig 272

duced by excision of tumors in the eye region. Plas & Recons Surg., 4 178-187 March 1949
17 Wiener Meyer and Scheie Harold G Surgery of the eye. 3rd ed New York, Grune & Stratton 1952 315-318
18 Bivar Caldas Cancer da orbita Tratamento pela eletrocirurgia e enxerto autoplástico Rev Méd panamericana 2 25-41 July August, September 1945
19 Kirby Daniel B Two cases of exenteration of the orbit with skin grafts. Arch Ophth., 6 309-311 1931
20 Jones, Ira S., and Pfeiffer Raymond L. Lacrimal gland tumors Roentgenographic diagnosis. Trans. Amer Acad Ophth., 841-847 Nov Dec 1954
21 Forrest, Arnold W Epithelial lacrimal gland tumors Pathology as a guide to prognosis. Trans Amer Acad Ophth. 848-865 Nov Dec 1951
22 Warthin Aldred Scott A case of endothelioma of the lachrymal gland (myxo-chondro-endothelioma cylindromatodes) with an analysis of previously reported cases of lachrymal gland tumors. Arch Ophth., 30 601-620 1901
23 Davies Windsor S Neoplasms of the lacrimal gland with a report of two cases Arch Ophth 12 33-37 July 1934
24 Sanders, Theodore E Mixed tumors of the lacrimal gland. Arch. Ophth. 21 239-260 Feb 1939
25 Forrest, Arnold W Intraorbital tumors Arch Ophth., 41 198-230 Feb 1949
26 Reese, Algernon B Tumors of the eye New York, Hoeber Harper 1953
27 Reese Algernon B The treatment of expanding lesions of the orbit with particular regard to those arising in the lacrimal gland. (The 7th Arthur J Bedell Lecture) Given at the 7th Ann Cl Conference of the Staff and Ex Residents of Wills Eye Hospital Philadelphia Pa., Feb 19 1955 to be published in *the American Journal of Ophthalmology*
28. Davies Windsor S Pleomorphic adenoma and adenoma of the lacrimal gland Given at the meeting of the Am Ophthalmological Society June 4 1955 and to be published in their Transactions for 1955
29 Sanders, Theodore E., and Ackerman, L V Tumors of the lacrimal gland their prognosis. Given at the meeting of the Am. Ophthalmological Society June 4 1955 and to be published in their Transactions for 1955
30 Naffziger H C and Jones O W The surgical treatment of progressive exophthalmos following thyroidectomy J A M A 99 638-642 Aug 20 1932
31. Benedict, William L Removal of orbital tumors Surg Gyn. & Obst., 58 383-389 Feb 1934
32 Love J G Transcranial removal of an intraorbital meningioma. Proc Staff Meet Mayo Cl., 10 213-215 1935
33 Dandy W E Orbital tumors Results following the transcranial operative attack. New York, Oskar Priest, 1941
34 Love J G., and Benedict, W L. Transcranial removal of intraorbital tumors. J A M A., 129 777-784 Nov 17 1945
35 Benedict, W L. Surgical treatment of tumors and cysts of the orbit. Am J Ophth., 32 763-773 1949
36 Love J G., and Dodge H W Transcranial removal of intraorbital tumors. Arch. Surg., 67 370-379 Sept. 1953
37 Stallard H B A plea for lateral orbitotomy (Krönlein's operation) Brit M J 1 408-409 1947
38 Wright Arthur Dickson Approach to orbital tumors. Trans Ophth. Soc U K., 68 367-375 1949
39 Lambert, V F The rhinologist and the orbit—some personal recollections Proc. Roy Soc Med 48 79-85 (Section of Laryngology pp 1 7) Feb 1955

Greffon du Muscle Temporal pour les Pertes de Substance Consecutives à l'Enucleation Orbitaire. Jerome P Webster.

Compte-rendu de 2 cas qui illustrent une utilisation rare du muscle temporal Dans chaque cas ce muscle a été décollé de son insertion avancé et transplanté pour aider au comblement *de la cavité* orbitaire après énucléation et excision péri-orbitaire. Dans un cas, cette technique a été utilisée pour sauver la vie do malade puisqu'il s'agissait d'obturer une ouverture qui mettait à nue les méninges et de refermer des trous dans les voies aériennes accessoires.

Dans le second cas le muscle a diminué la profondeur de la cavité orbitaire et la déformation s'est ainsi trouvée réduite. Elle a servi également à consolider la dure mère la ou le plancher osseux avait été enlevé

Dans les deux cas la transplantation musculaire a constitué un lit excellent pour le recouvrement tant immédiat que secondaire avec des greffes dermo-épidermiques à amélioré l aspect du malade en ne nécessitant que le minimum de temps opératoire et la transplantation n a entraîné aucune gêne

Transplantation von Temporalmuskeln bei Defekten im Anschluss an Exenteratio orbitae. Jerome P Webster.

Es wird über 2 Fälle berichtet, die den seltenen *Gebrauch des Temporalmuskels* illustrieren. In beiden Fällen wurde dieser Muskel von seinem Ursprung abgetrennt, vorwärts gedreht und transplantiert, um die Orbitalhöhle nach Enucleation und periorbitaler Excision ausfüllen zu helfen. In einem Fall wurde diese Methode als ein lebenerettendes Mittel benutzt, um eine Öffnung in den exponierten Meningen und auch Öffnungen in den akzessorischen Luftwegen zu verschliessen

operations When extensive lid destruction is due to cancer, it is seldom possible to save the eyeball and surgery usually includes exenteration of the orbit The purpose of this paper is to present a case of full-thickness reconstruction of the entire lower lid and of the lateral half of the upper lid

Case history A 60 year old patient was referred to the "Fondation Curie" in April 1953 with a recurrent basal cell carcinoma involving most of the lower lid of his right eye, the external canthus, the lateral third of the upper lid spreading towards the corresponding fornices (Fig 273, top left) In 1944 he had sustained a small electrical burn of the inferior right eyelid In 1949 a small tumor appeared at this level and was electrocoagulated without pathological examination In 1950 another tumor appeared near the external canthus and was again coagulated in 1952 In February 1953, the lesions, having rapidly spread, affected the lateral half of the lower lid, the external canthus and the adjoining portion of the upper lid The patient was then treated by radiumpuncture

When we saw this patient, 2 months later, the lesions had extended still farther, as described previously, and we had to decide what should be the best treatment in view of the special circumstances of this case

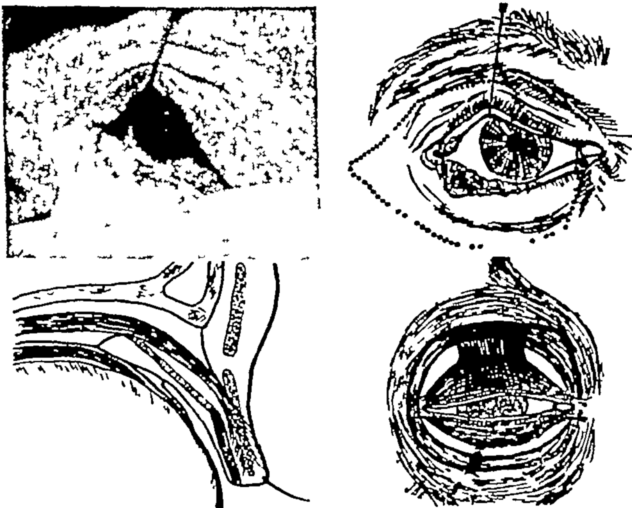


FIG 273 (top left) Recurrent basal cell epithelioma of the lower lid extended to the external canthus, the lateral third of the upper lid and towards the corresponding fornices (Top right) Extent of full thickness excision of both eyelids and of the surrounding irradiated skin (Bottom left) Diagrammatic sagittal section through the upper lid and eyeball (Bottom right) Orbicularis muscle—(the palpebral and orbital portions are purposely separated)—the levator palpebrae superioris

A biopsy confirmed the clinical diagnosis of an actively growing basal cell carcinoma

In view of the fact that this patient had congenitally in the other eye only 1/10 of normal vision, and that he had recently received large doses of radiation, we decided with the radiotherapist to perform a surgical excision of the lids only followed by plastic repair, and with conservation of his right eye

Operation and post-operative condition On May 19, 1953, we excised the entire lower lid from the punctum lacrimale to the outer canthus with all the adjacent irradiated skin and a little more than the lateral half of the upper lid (Fig 273, top right) All the corresponding fornices were removed in continuity as well as the bulbar conjunctiva up to its adherent zone around the cornea known in French as "l'anneau conjonctival" (Fig 274, top left) Immediate repair was done in the following manner The remaining medial half of the upper lid was split along its intermarginal grove, known as the "gray line," and divided along its natural anatomical cleavage plane into two laminae a superficial one containing the skin and muscles (orbicularis and inner fibres of the levator), (Fig 273, bottom right), a deep one composed of tarsus and conjunctiva (Fig 273, bottom left) This tarsoconjunctival plane was dissected, past the fornix, up to its bulbar attachments (Fig 274, top right) in order to free the remaining conjunctiva sufficiently to allow it to cover the cornea without tension This freed conjunctiva was then sutured to the pericorneal conjunctival flange (Fig 274, bottom left) with a running suture of 00000 plain gut on an ophthalmic atraumatic needle This provides natural protection and cover of the cornea (Fig 274, bottom right)

A supraorbital flap with an external temporal pedicle was then elevated (Fig 275, top left) and brought down over the eyeball, whilst the eyebrow bearing skin was dissected in order that it could be rotated upwards over the donor site of the primary flap (Fig 275, top right) The suture of these flaps into position provided complete cover of the whole operation area (Fig 275, center left)

Examination of the specimen confirmed the previous pathological findings and showed the

is carried right down to bone where a fair sized window is made to expose the nasal mucous membrane. A subcutaneous tunnel is then made between the two incisions.

On each side of the incisions a flap is raised as indicated in the diagrams Nasal mucosa and conjunctiva are then united (Fig 272B) thus forming an epithelial bridge leading from the conjunctival sac into the nasal cavity The operation is concluded by closing the skin incision over the nose No after treatment is necessary

Unless severe infection complicates the post-operative period, the size of the new duct is given by the width of the epithelial bridge To prevent such an infection the operations have been carried out under adequate administration of antibiotics.

It seems obvious that the method may be modified according to the level of the lesion. For instance if the canaliculi alone are destroyed the conjunctival flap may be brought down to meet a flap from the lachrymal sac

Results

One case was operated on in 1950 and the others in 1954 In four cases the method proved successful inasmuch as the troublesome epiphora was stopped under normal meteorological conditions. On one eye the result was not good enough owing to faulty technique.

By this method one cannot expect a normal lachrymal drainage owing to absence of the normal pumping action" provided by the lachrymal sac One may however expect that tears constantly flowing down the cheek are stopped.

Postscript

The operation has only been carried out in a very limited number of cases and its value cannot be assessed on this background It is therefore the author's sincere hope that those colleagues who have greater access to these particular cases would try the method and report on their results.

Une Tentative de Rétablissement du Drainage Lacrymal. Halfdan Schjelderup

On établit sous la peau une communication entre le sac conjonctival et la cavité nasale là où se trouve le sac lacrymal obstrué.

Une lanière de conjonctive est abaissée pour rencontrer un lambeau de muqueuse nasale de façon à établir une lanière continue d'épithélium qui conduit du sac conjonctival dans le nez. Ce pont se tubulisera ultérieurement tout seul comme cela se passe dans l'opération de Denis Browne pour hypospadias.

Le succès opératoire a été obtenu dans 4 yeux sur 5 puisque l'épiphora s'est trouvée arrête dans des conditions météorologiques normales

Ein Versuch, Tränenabfluss wiederherzustellen. Halfdan Schjelderup

Eine Verbindung wird zwischen dem Konjunktivalsack und der Nasenhöhle subkutan in der Gegend des verschlossenen Tränensackes hergestellt

Ein Streifen von Konjunktiva wird herabgezogen um sich mit einem Lappen aus der Nasenschleimhaut zu vereinigen, womit ein kontinuierlicher Streifen von Epithel hergestellt wird der vom Konjunktivalsack in die Nase hineingeführt wird Diese Brücke wird sich anschliessend selbst in einen Kanal umwandeln, ähnlich dem was bei der Denis Brown Operation bei Hypospadie stattfindet.

Die Operationen erwiesen sich als erfolgreich in 4 bis 5 Fällen, insofern als die Epiphora bei normalen Wetterbedingungen aufhörte

Un Intento de Restablecimiento del Drenaje Lacrimal. Halfdan Schjelderup

Se establece una comunicación subcutánea entre el saco conjuntival y la cavidad nasal en la región del saco lacrimal obliterado Un colgajo de conjuntiva es tirado hacia abajo hasta reunirse con un colgajo de mucosa nasal estableciéndose así una tira continuada de epitelio que conduce del saco conjuntival a la nariz Este puente se convertirá en un tuvo similármente como lo que sucede en la operación de Denis Brown para hipospadias.

La operación ha tenido éxito en cuatro de cinco casos, suspendiendo la epífora en condiciones meteriológicas normales.

A Case of Reconstruction of Both Eyelids Following Excision for Recurrent Carcinoma. Jean Bernard Escoffier, Dr Paris France

Plastic repair of both upper and lower lids is an uncommon challenge that has rarely been reported in the literature. Injuries resulting in complete destruction of both eyelids usually involve damage to the eyeball and the socket and therefore the plastic problem is a purely cosmetic one that is better taken care of by prostheses than by multiple, tedious and costly

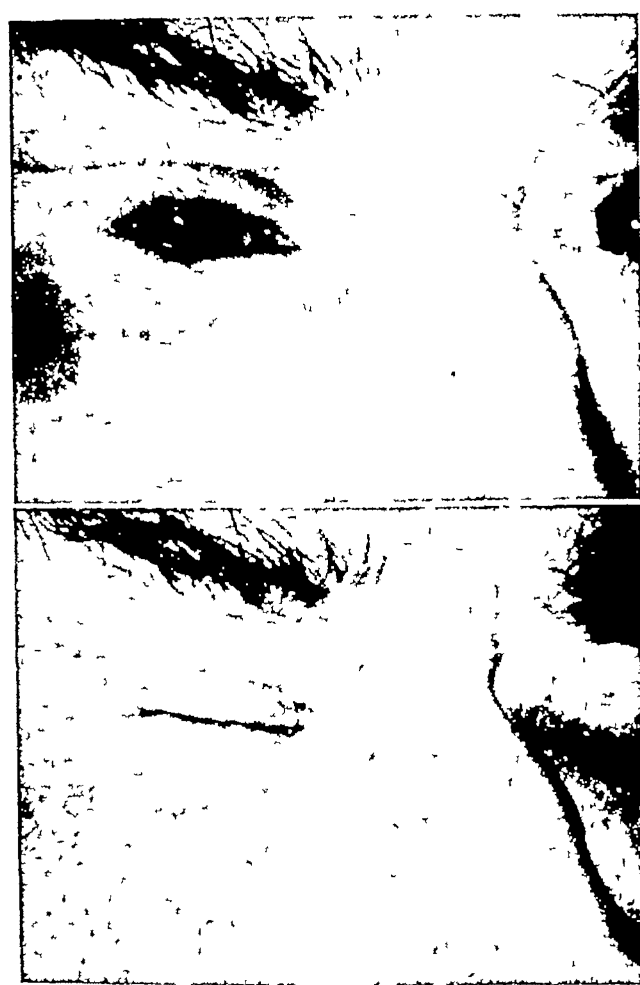


FIG 276 (top) Post-operative result The palpebral fissure is somewhat narrower but allows for normal vision (Bottom) Post-operative result Active closure of the palpebral fissure is satisfactory

Since all previously irradiated tissues had been removed, Roentgentherapy could therefore be given later efficiently and safely A maximum dose of 5 350 r was distributed over a very localized field, the surrounding tissues and the eyeball being protected by especially designed molds Eighteen months have elapsed since the end of this treatment and no evidence of recurrence has yet been noted

DISCUSSION

It appears interesting to relate the management of this particular case for two reasons

1 From the point of view of the malignant growth, this case presented difficult therapeutic problems

Further radiation seemed contra-indicated when first seen The problem was to decide whether surgery should be radical and include eventeration, thus leaving the patient practically blind, or whether an attempt should be made to save his valid right eye

The conservative course of surgical excision, as extensive as compatible with immediate plastic repair, was adopted This enabled roentgentherapy to be efficiently performed 6 months later, when a small recurrence was detected Two years after surgery, eighteen months after X-ray therapy, the patient still has the normal use of his eye and is free from any detectable recurrence

This illustrates the paramount importance of teamwork in a Cancer Institute The preservation of the vision of this patient has been the reward of radio-surgical collaboration

2 From a purely technical angle, the problem presented by immediate plastic repair was also somewhat unusual If we except the fundamental principle of lid splitting, it is obvious that none of the commonly described procedures for lid reconstruction, which generally resort to the use of the opposite lid, could be applied in this case, where the conjunctival loss was especially extensive Both lids were affected by the tumor and a certain amount of surrounding skin had undergone radiodystrophic changes

It is interesting to note that, despite the scantiness of the remaining conjunctiva used for repair, the functional result was very satisfactory This is mainly due to three favourable factors the capacity of palpebral conjunctiva to stretch, the retention of the orbital portion of the orbicularis muscle (Fig 273, bottom right) which closes the palpebral fissure tightly, and, chiefly, the presence of some inner fibres of the levator palpebrae superioris with their cutaneous attachments to the remaining inner portion of the upper lid (Fig 273, bottom)

SUMMARY

A case of recurrent basal cell carcinoma of the right lower lid extending to the external canthus, the lateral third of the upper lid and the corresponding fornices is presented

Previous radiumpunctures contra-indicated further irradiation and there was congenital lack of vision in the other eye

These two considerations determined the choice of treatment by excision of the full thickness of the eyelids followed by immediate plastic repair in an attempt to save the vision in the

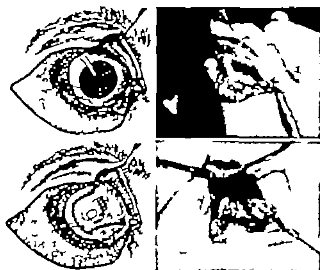


FIG 274 (top left) Extent of bulbar conjunctiva excision (Top right) The remaining mesial half of the upper lid has been cleft into two distinct laminae skin muscle and tarsoconjunctiva. The latter is retracted. Dissection is carried out past the level of the fornice (Bottom left) The dissected palpebral conjunctiva is allowed to stretch over the cornea and is sutured to the pericorneal conjunctival flange. (Bottom right) The cornea is covered by the remaining palpebral conjunctiva

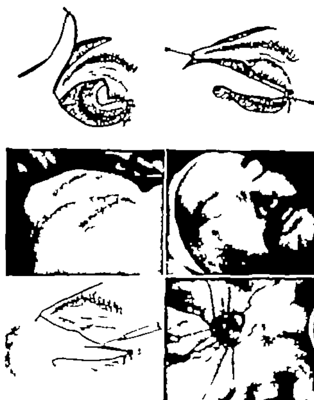


FIG. 275 (top left) A supraorbital flap is raised to reconstruct the missing lids. (Top right) The eye-brow bearing flap is rotated over the donor area of the supraorbital flap which is brought down over the eyeball. (Center left) The two flaps are sutured into position. (Center right) The patient six weeks later (Bottom left) The flap and the parietal conjunctiva attached to it are incised at the desired level of the palpebral fissure (Bottom right) The conjunctiva is sutured to the skin along the margins of the reconstructed lids with long interrupted sutures.

presence of radiodystrophic lesions of the skin.

Six weeks later the patient returned to the operating room (Fig 275 center right) where the flap covering the eyeball was incised under local analgesia at the level of the desired palpebral fissure (Fig. 275 bottom left) This was done with a fine ophthalmic scalpel inserted cutting edge upward, between the bulbar conjunctiva over the cornea and the parietal conjunctiva that was now adherent to the flap used to replace the eyelids As soon as the fissure was completed and the eye exposed we asked the patient to move his eye open and close the lids and to number the fingers we presented in front of his right eye. He was able to accomplish all of these manoeuvers correctly

We then sutured the conjunctiva to the skin along the margins of the reconstructed lids with long interrupted sutures of 0000 black silk (Fig 275 bottom right) which were subsequently tied together over a small roll of vaseline gauze. These sutures were removed 3 days later

The post-operative result was good The palpebral fissure, although narrower than on the opposite side allowed for normal vision (Fig 276 top) The function of the new lids was very satisfactory since this patient could actively open and close his eye without trouble (Fig. 276 bottom)

Two years after this plastic operation the functional result remains excellent (Fig 277) This patient has a useful eye. The reconstructed lids are perfectly adequate to protect it and do not impede the vision which is clear in all directions.

However from the point of view of his basal cell carcinoma, this case should be considered as a surgical failure. This is one of the reasons why we have wished to present it as an embarrassing problem of therapeutic management.

Six months after surgical excision and repair in November 1953 a tiny recurrence was detected, at a routine follow up examination in the lateral part of the reconstructed lower fornix this was confirmed by biopsy

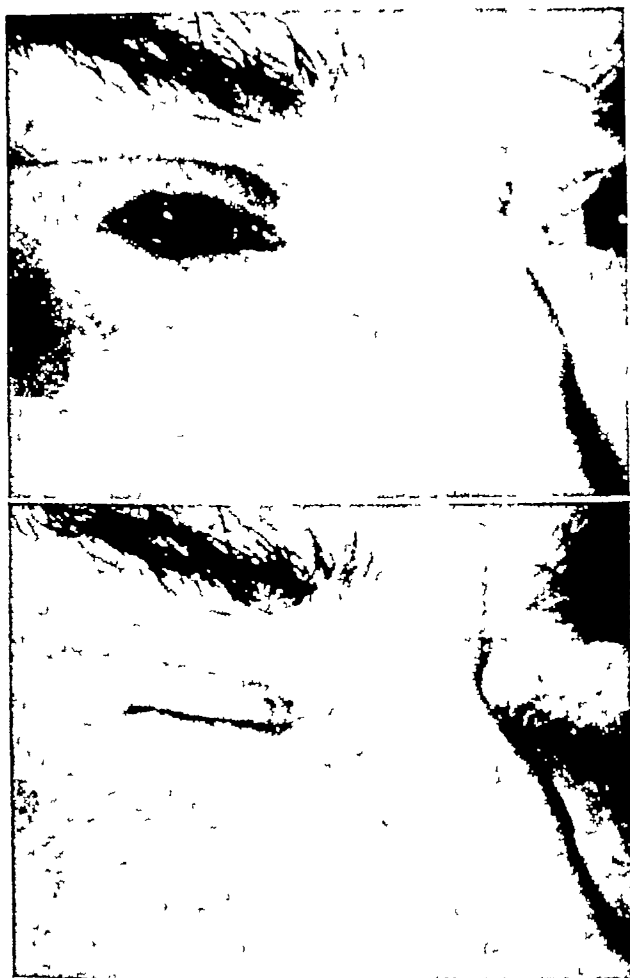


Fig 276 (top) Post-operative result The palpebral fissure is somewhat narrower but allows for normal vision (Bottom) Post-operative result Active closure of the palpebral fissure is satisfactory

Since all previously irradiated tissues had been removed, Roentgentherapy could therefore be given later efficiently and safely A maximum dose of 5 350 r was distributed over a very localized field, the surrounding tissues and the eyeball being protected by especially designed molds Eighteen months have elapsed since the end of this treatment and no evidence of recurrence has yet been noted

Discussion

It appears interesting to relate the management of this particular case for two reasons

1 From the point of view of the malignant growth, this case presented difficult therapeutic problems

Further radiation seemed contra-indicated when first seen The problem was to decide whether surgery should be radical and include exenteration, thus leaving the patient practically blind, or whether an attempt should be made to save his valid right eye

The conservative course of surgical excision, as extensive as compatible with immediate plastic repair, was adopted This enabled roentgentherapy to be efficiently performed 6 months later, when a small recurrence was detected Two years after surgery, eighteen months after X-ray therapy, the patient still has the normal use of his eye and is free from any detectable recurrence

This illustrates the paramount importance of teamwork in a Cancer Institute The preservation of the vision of this patient has been the reward of radio-surgical collaboration

2 From a purely technical angle, the problem presented by immediate plastic repair was also somewhat unusual If we except the fundamental principle of lid splitting, it is obvious that none of the commonly described procedures for lid reconstruction, which generally resort to the use of the opposite lid, could be applied in this case, where the conjunctival loss was especially extensive Both lids were affected by the tumor and a certain amount of surrounding skin had undergone radiodystrophic changes

It is interesting to note that, despite the scantiness of the remaining conjunctiva used for repair, the functional result was very satisfactory This is mainly due to three favourable factors the capacity of palpebral conjunctiva to stretch, the retention of the orbital portion of the orbicularis muscle (Fig 273, bottom right) which closes the palpebral fissure tightly, and, chiefly, the presence of some inner fibres of the levator palpebrae superioris with their cutaneous attachments to the remaining inner portion of the upper lid (Fig 273, bottom)

Summary

A case of recurrent basal cell carcinoma of the right lower lid extending to the external canthus, the lateral third of the upper lid and the corresponding fornices is presented

Previous radiumpunctures contra-indicated further irradiation and there was congenital lack of vision in the other eye

These two considerations determined the choice of treatment by excision of the full thickness of the eyelids followed by immediate plastic repair in an attempt to save the vision in the

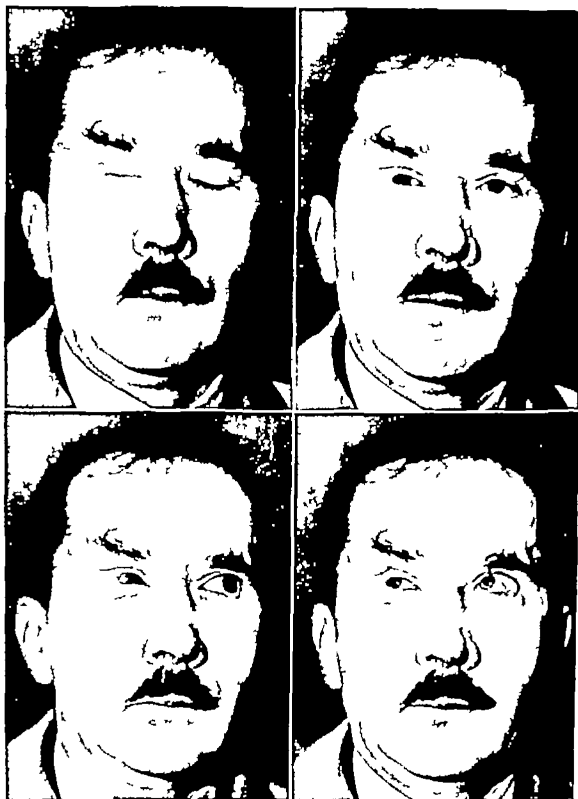


FIG 277 Two years later Normal function of the right eye and of the reconstructed lids. The patient has normal vision in his right eye in all directions.

only good eye The operation was performed in two stages, requiring minimal hospitalisation

The technic used for reconstruction of both lids is described

The functional result is presented two years after the operation

The therapeutic management of the case is discussed

REFERENCES

1 Blair, V P, Brown, J B, and Hamm, W G Types of reconstructive surgery of the orbital region The Southern Surgeon, I 293, 1933
2 Brown, J B, and Cannon, B Full thickness skin grafts from the neck for function and color in eyelid and face repair Annals of Surgery, 121 639, 1945
3 Dufourmentel, L Chirurgie Réparatrice et Correctrice des Téguments et des Formes Masson et Cie Paris, 1939, p 105
4 Dewulf, L Over de Behandeling van het Epithelioma der oogeliden Belg Tschr Geneesk, 3 317, 1947
5 Dupuy Dutemps, L Monde Méd, 38 705, 1928
6 Duverger et Velter Thérapeutique Chirurgicale Ophtalmologique Paris, Masson et Cie 1926, p 93
7 Figi, F A Plastic surgery of the eyelids Plastic and Reconst Surg, 5 403, 1950
8 Fox, S A Ophthalmic plastic surgery Grune and Stratton New York, 1952
9 Hughes, W S Reconstructive surgery of the eyelids London, Henry Kimpton, 1943
10 Manchester, W M A simple method for the repair of full-thickness Defects of the lower lid with special reference to the treatment of neoplasms Brit J Plast Surg, III 252, 1951
11 Morax, V Cancer de l'Appareil Visuel Doin et Cie, Paris, 1925
12 Reese, A B Partial resection of lid and plastic repair for epithelioma and other lesions involving margin of lid Arch Ophth, 32 173, 1944
13 Reese, A B Tumors of the eye, Pp 8, 12, 15 New York Paul B Hoeber, Inc, 1951
14 Saint-Martin, M L'Excision des Cancers des Paupières d'après la Technique d'Imre Bull Soc D'Opht, Paris, 49 36, 1937
15 Turner, L, and McPherson, S D Surgical treatment of malignant tumors of the eyelid South Med Jour, 46 633, 1953
16 Ward, G E, et Hendrick, J W Tumors of the Head and Neck The Williams Wilkins Co, Baltimore, 1950, p 505

Un Cas de Réconstruction des Deux Paupières a la Suite d'Excision pour Cancer Récidivant. JEAN-BERNARD ESCOFFIER

Un cancer baso-cellulaire de la paupière inférieure a envahi l'angle externe et de la le tiers externe de la paupière supérieure et par endroit les fornix correspondants On traite par excision et réparation immédiate

L'Excision comporte toute l'épaisseur des paupières et une grande partie de la conjonctive bulbaire

On décrit la technique de la réparation

6 mois après l'opéeration une récidive minime est traitée de manière efficace par radiothérapie sur un champ très localisé On présente le résultat fonctionnel deux ans après la réparation

On discute les problèmes soulevés par ce cas

Ein Fall von Wiederherstellung beider Augenlider nach Excision eines rezidivierenden Karzinoms. JEAN-BERNARD ESCOFFIER

Ein Fall von rezidivierendem Basalzellenkarzinom des Unterlides, das sich bis auf den außeren Augenwinkel, das laterale Drittel des Oberlides und stellenweise auf die entsprechenden Umschlagsfalten erstreckte, wurde mit Excision und sofortigem Ersatz behandelt

Die Excision schließt die Lider in voller Dicke und den großten Teil der Conjunctiva bulbi ein

Die Technik des Ersatzes wird beschrieben 6 Monate nach der Operation wurde ein winziges Rezidiv mit Rontgenbestrahlung im Bereich eines sehr begrenzten Feldes beseitigt

Das funktionelle Ergebnis zwei Jahre nach der Wiederherstellung wird vorgestellt Die aus diesem Fall sich ergebenden Probleme werden besprochen

Un Caso de Reconstrucción de Ambos Párpados Despues de la Escisión de Carcinoma Recurrente. JEAN-BERNARD ESCOFFIER

Un caso de carcinoma basocelular del párpado inferior extendido al canto externo, al tercio lateral del párpado superior y a los fornix es tratado mediante resección y reparación inmediata

La resección comprende todo el espesor de los párpados y la mayor parte de la conjuntiva bulbar

Se describe la técnica de reparación

Seis meses despues de la operación una pequeña recurrencia se trata bien por medio de roentgenterapia aplicada sobre un campo muy localizado

Se presentan los resultados funcionales dos años despues de la reparación

Se discute el problema concomitante con este caso

Mucous Membrane Grafting. With a Specially Designed Grafting Knife.

RANDELL CHAMPION, Mr, *24 a St John Street, Manchester, England*

The necessity for mucous membrane grafts to replace injured or scarred conjunctiva has been appreciated for many years but most of the

mucous membrane grafts described in the literature are full thickness grafts which leave donor sites requiring suturing or split skin grafting The raw areas are often allowed to heal on their own but the resultant scarring creates an unpleasant unevenness inside the mouth.

Kiehn [1] describes taking full thickness mucous membrane grafts up to 6 x 8 cm and states that in all the cases the buccal surface healed promptly without fibrous or cicatricial contraction. If the buccal raw surface is not grafted or sutured then some fibrosis and scarring is inevitable. The ideal is to have a split mucous membrane graft so that the donor site heals quickly within 7 to 10 days and Barsky [2] demonstrates the taking of a thin mucous membrane graft from the lower lip by shaving it off with a razor This technique is extremely difficult and only small pieces of variable thickness graft are available.

The author realized that there was a need for a thin mucous membrane of reasonable dimensions in plastic and ophthalmic surgery and designed a knife for this purpose The main requirements were that it should be small have a replaceable blade to ensure sharpness and an adjustable roller to maintain even thickness The blade required to have small overall dimensions and the grafting knife was designed around a razor blade. This blade was adapted to fit a frame to which was attached a handle and a small adjustable roller The knife is easy to assemble and its width from cutting edge to the back of the blade is reduced to 1 cm (Fig 278) *

Technique for taking a mucous membrane graft A graft may be taken from either the upper or lower lips (Fig 279) or from the cheek. When the lips are used the lip is made taut by the application of four to six sutures at 1 cm intervals at the vermilion margin these are held tight by an assistant and in order to obtain a flat surface a small metal tongue spatula is placed on the skin surface of the lip The graft may then be taken by commencing near the edge of the lip and working towards the buccal sulcus When the graft is taken from the cheek four to six sutures are applied to the vermilion margin in the corner of the mouth at about 1 cm intervals these are pulled taut by an assistant and the knife is moved from the upper buccal sulcus to lower buccal sulcus or reverse according to the side from which the graft is taken and whether the operator is right or lefthanded. In this way a reasonable piece of mucous membrane may be obtained measuring 3-5 cms in length and 2-3 cms in width.

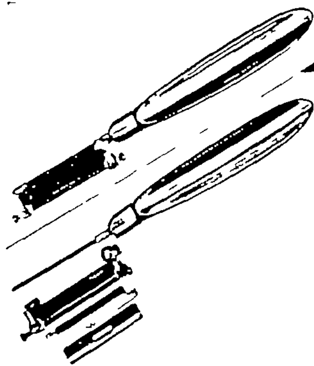


Fig. 278

One of the minor difficulties is to obtain free movement of the roller when taking the graft, as the knurling on the roller often fails to engage with the rather moist and slippery mucous mem-



Fig. 279 Technique for taking graft from lower lip

* The mucous membrane grafting knife is available from John Weiss & Son Ltd., 287 Oxford St., London, W.1 The blade used is the Pal injector blade made by Pal Personna Blades Ltd., London.

brane The knife should be moved in short to and fro movements and sometimes the knife does not appear to be cutting the graft, but if the excursions are continued to the desired length of the lip, the graft will be found to be all nicely cut and bunched together near or almost beneath the roller As there is a limited amount of mucous membrane available it is advisable to test the thickness of the graft by taking a small area of thigh or abdominal skin and adjusting the roller to the desired thickness As soon as the graft is taken it is important to spread it on tulle gras with the raw surface upward, for if the graft is wrapped in moist gauze and left for sometime, then it is often difficult to distinguish which is the raw surface owing to the similarity in appearance of both sides of the graft This grafting knife is also useful for taking small split skin grafts required for eyelids or for the face

Suitable types of cases for mucous membrane grafting Split mucous membrane grafts have been used in ophthalmic cases for replacement of damaged or fibrosed conjunctiva and also in cases where the mucous membrane of the lip has been lost by trauma Mucous membrane has also been used for urethral reconstruction—Kiehn [1]

Ralph Siegal [3] maintained that every conjunctival corneoconjunctival burn of real gravity causing destruction of the vascular supply to the cornea should have a graft of buccal mucous membrane as soon as possible after injury He stated that early grafting stimulated healing, helped in the early restoration of function and minimised scar formation with symblepharon

Only one case of a recent burn of the cornea was grafted, Case 2, but the result was not successful, as the damage was extensive The result of a healed burn of the conjunctiva (Fig 280) gave an excellent result

Other ophthalmic cases treated included the rare pathological condition such as essential shrinkage, spring catarrh and intraepithelial epithelioma of the conjunctiva In these cases the grafting was confined to the upper or lower fornix and the technique of application of the graft was standardized as follows The graft was sutured to the eyeball at the cut bulbo-conjunctival edge leaving 3 to 4 sutures long, and the corresponding number of long silk sutures were left, where the mucous membrane was sutured to the eyelid The graft was closely applied to the raw surface by packing small pieces of tulle gras in the new fornix and this was held into position by oversewing the long silk ties The graft was dressed on the 5th or 6th day A bandage was applied for the first 24 hours and then the eye irrigated 2-3 times a day, and gutta ablucid 10 per cent were applied A contracted eye socket and three traumatic losses of mucous membranes of the lip are included in the cases treated

Cases Treated

In all, 10 cases have been treated with split mucous membrane grafts, 7 were to replace the conjunctiva and 3 to replace mucous membrane of the lip

Case 1—T N, male—aged 51 Diagnosis—symblepharon In August 1953, this patient sustained a caustic soda burn of the left eye with



Fig 280 Symblepharon left lower fornix before and one month after grafting

mucous membrane grafts described in the literature are full thickness grafts which leave donor sites requiring suturing or split skin grafting The raw areas are often allowed to heal on their own but the resultant scarring creates an unpleasant unevenness inside the mouth.

Kiehn [1] describes taking full thickness mucous membrane grafts up to 6 x 8 cm and states that in all the cases the buccal surface healed promptly without fibrous or cicatricial contraction. If the buccal raw surface is not grafted or sutured then some fibrosis and scarring is inevitable The ideal is to have a split mucous membrane graft so that the donor site heals quickly within 7 to 10 days, and Barsky [2] demonstrates the taking of a thin mucous membrane graft from the lower lip by shaving it off with a razor This technique is extremely difficult and only small pieces of variable thickness graft are available.

The author realized that there was a need for a thin mucous membrane of reasonable dimensions in plastic and ophthalmic surgery and designed a knife for this purpose The main requirements were that it should be small have a replaceable blade to ensure sharpness and an adjustable roller to maintain even thickness. The blade required to have small overall dimensions and the grafting knife was designed around a razor blade This blade was adapted to fit a frame to which was attached a handle and a small adjustable roller The knife is easy to assemble and its width from cutting edge to the back of the blade is reduced to 1 cm (Fig 278) *

Technique for taking a mucous membrane graft A graft may be taken from either the upper or lower lips (Fig 279) or from the cheek. When the lips are used the lip is made taut by the application of four to six sutures at 1 cm intervals at the vermilion margin these are held tight by an assistant and in order to obtain a flat surface a small metal tongue spatula is placed on the skin surface of the lip The graft may then be taken by commencing near the edge of the lip and working towards the buccal sulcus When the graft is taken from the cheek four to six sutures are applied to the vermilion margin in the corner of the mouth at about 1 cm intervals, these are pulled taut by an assistant and the knife is moved from the upper buccal sulcus to lower buccal sulcus or reverse according to the side from which the graft is taken and whether the operator is right or lefthanded. In this way a reasonable piece of mucous membrane may be obtained measuring 3-5 cms in length and 2-3 cms in width.

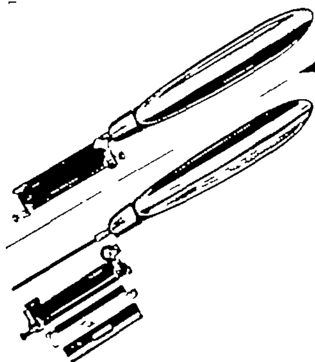


Fig. 278

One of the minor difficulties is to obtain free movement of the roller when taking the graft, as the knurling on the roller often fails to engage with the rather moist and slippery mucous mem-



Fig 279 Technique for taking graft from lower lip

* The mucous membrane grafting knife is available from John Weiss & Son Ltd 287 Oxford St., London, W.1 The blade used is the Pal injector blade made by Pal Personna Blades Ltd., London.

discomfort There had been no further corneal ulcers and the patient stated that he had been much happier since he had the operation It may be that wider excision would have prevented the recurrence of the granulations

Case 6—W C, male—aged 60 yrs Diagnosis—intra-epithelial epithelioma (Bowen's disease) of the lower fornix of the right eye In October 1950, the involved conjunctiva was excised, this necessitated excising the lower half of the bulbar conjunctiva and the lower eyelid conjunctiva A split mucous membrane graft was applied to the raw surface and sutured into position The graft took well and gave a satisfactory result (Fig 281)

Case 7—T L, male—aged 51 yrs Diagnosis—contracted eye socket At the age of three years this patient lost his left eye following measles He wore an eye shell until 12 months previously when the shell would not be retained as there was contraction of the lower fornix In March 1955, the scar tissue in the lower sulcus was excised and a graft applied to the raw surface—it was held in position by oversewn tulle gras The graft took well and the patient was able to wear a newly fitted shell

Case 8—E G, male—aged 15 yrs Diagnosis—small area full thickness loss mucous membrane of lip On 16th August 1951, this patient was involved in a bicycle accident and received injuries to his upper lip resulting in a small area of full thickness mucous membrane loss On the same day as the injury, a split mucous membrane graft was taken from the lower lip and applied to the raw surface The graft took satisfactorily On 7th January 1952, the graft had settled giving a good cosmetic result (Fig 283)

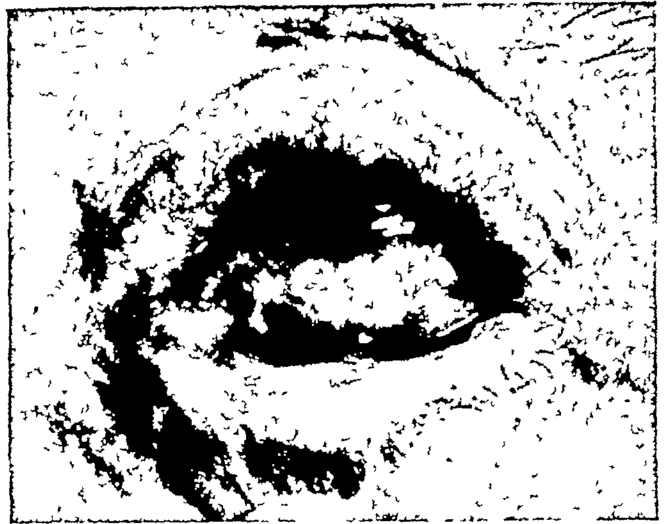


Fig 282 Six months after grafting lower fornix for essential shrinkage of conjunctiva

Case 9—P W, female—aged 12 yrs Diagnosis—small area full thickness loss mucous membrane of lip In February 1951, this patient sustained full thickness mucous membrane loss of the lower lip to a dog-bite The same day as the injury, a split mucous membrane graft was taken from the upper lip and applied to the raw area The graft took well There was some contracture of the graft giving some unevenness of the vermilion margin

However, from a cosmetic point of view the result was reasonable

Case 10—J D, male—aged 17 yrs Diagnosis—full thickness mucous membrane loss of upper lip At the age of six years he sustained a dog-bite of the upper lip There was full thickness skin loss of the right half of the upper lip as well as some loss of adjacent mucous membrane and the area had been covered with a split skin graft taken from the leg At the age of 17 years he attended complaining of the disfigurement caused where the skin graft had re-



Fig 283 (left) Traumatic avulsion mucous membrane upper lip (Center) Two weeks after grafting (Right) Six months after grafting

subsequent formation of a symblepharon of the lower fornix. He had diplopia on looking upwards. In June 1955 the scar of the lower fornix was excised and the raw area covered with a split mucous membrane graft taken from the lower lip The graft took well and gave a satisfactory result (Fig. 280)

Case 2—M R., male—aged 20 yrs Diagnosis—lime burn of right eye In October 1951, this patient received severe burns to the right eye when lime was splashed on his face

Examination under anaesthesia revealed that most of the bulbar conjunctiva and some of the lid conjunctiva had been destroyed by the lime. Three days after injury the injured conjunctiva of the upper half of the bulb and the upper eyelid was excised. A split mucous membrane graft was applied to the raw surface Owing to the gross destruction of tissue and the infection there was limited take of the graft. Soon after a tarsorrhaphy was performed and no further treatment attempted.

Case 3—C W., female—aged 56 yrs Diagnosis—essential shrinkage of the conjunctiva In May 1952 the bulbar conjunctiva was dissected off the lower half of the right bulb after an incision at the limbus The conjunctiva was allowed to pass on to the lower eyelid and it was sutured at the lower part of the fornix. A split mucous membrane graft was applied to the raw surface The result of the grafting was very satisfactory and when examined three years later it was difficult to distinguish the graft from the normal conjunctiva

In August 1953 the same type of operation was carried out on the left lower fornix, but instead of a split mucous membrane graft a full thickness mucous membrane graft was used. This graft took well and the result was satisfactory Functionally the result was good, but cosmetically the graft was very obvious and reddish when compared with the split mucous membrane graft on the right eye.

Case 4—A K female—aged 60 yrs Diagnosis—essential shrinkage of conjunctiva In January 1955 the lower half of the bulbar conjunctiva and the lower eyelid conjunctiva were excised and a split mucous membrane graft was applied to the raw surface and sutured into position. The result of the grafting was very satisfactory (Fig 282)

Case 5—J T H., male—aged 20 yrs Diagnosis—spring catarrh This patient first attended at the age of 15 years. The right eye was always affected more than the left. He had been treated by X rays Cortisone and beta-ray therapy without improvement.

In December 1953 he developed a large corneal ulcer In January 1954 the granulating tissue on the right upper lid overlying the tarsal plate was excised and a split mucous membrane graft applied to the raw surface The lid was everted so that the graft was exposed and this was kept with saline soaks. The graft took well and the eye was much more comfortable. When seen in March 1955 there had been recurrence of the granulations of the right eye but these granulations were flat and not causing undue



FIG. 281 (left) Intra-epithelial epithelioma right lower fornix before treatment. (Right) Intra epithelial epithelioma right lower fornix 5 years after grafting

VI

EAR

Reconstruction of the Auricle with Diced Cartilage Grafts. LYNDON A PEER,* M D, *Newark 2, N J, U S A*

Although reconstruction of an auricle is admittedly one of the most difficult problems facing the plastic surgeon, developments in the field during the past fifteen years have resulted in a general improvement as regards post-operative results The techniques used by different surgeons may appear somewhat diverse, but actually the basic principles are quite similar In all auricle construction a framework must be provided for the new auricle in the region of the absent ear and this framework must be covered with skin which, to an acceptable degree, conforms to the external contour of the framework Transference of the earlobe, which fortunately is usually present, into normal relationship with the skin-covered framework, and the transplantation of skin to cover the posterior surface of the new auricle are standardized procedures

Unfortunately, after this has been accomplished, some hairbearing scalp skin is usually present on the upper portion of the new auricle and a bald or hairless area of skin is seen above the auricle if an Esser Inlay has been used A hairless Wolfe graft from behind the normal ear or from the patient's clavicle may be used to replace the hairbearing skin on the new ear and hairbearing scalp flaps may be brought down to substitute for the bald area above and behind the ear

In Centers where large numers of auricles are reconstructed the main difference in technique is in the type of material or tissue used for structural support of the auricle In general, these consist of autogenous rib cartilage, preserved or fresh homogenous cartilage, preserved meniscus cartilage as a homograft, a composite structure of autogenous and homogenous cartilage and bone, or some sort of foreign body material such as the non-electrolite metals or polyethylene My own experience during the past twenty-two years with the reconstruction of about eighty auricles has been limited to the use of the patient's own autogenous rib cartilage and with preserved homogenous cartilage, either alone or in combination with autogenous cartilage I have not used fresh homogenous auricular cartilage as advocated by Sir Harold Gillies Experimental and clinical evidence indicates that fresh homogenous cartilage retains its structure about as well as preserved homogenous cartilage The auricular cartilage, however, has the exact structure of an auricle and it would be the ideal supporting material if it retained its cartilaginous structure over long periods of time

During the past thirteen years we have constructed some sixty-five auricles using diced cartilage grafts pre-formed in a perforated Vitallium ear mold Autogenous cartilage has been used whenever it is present in sufficient quantity In young children, however, and in some cases where both auricles are absent, preserved bank diced cartilage has been used to supplement the patient's own cartilage My experience with this method of reconstruction with a description of complications which may occur and the long-time post-operative results are presented in this communication

Diced cartilage grafts[1] consist of small segments of cartilage which can be packed or molded into any desired contour like wet grains of sand The term "diced" is descriptive but in practice the small segments were formed as flat

* St Barnabas Rehabilitation Center, Department of Plastic Surgery, Newark, N J

placed the mucous membrane. On 14th February 1954, the previous split skin graft in the region of the mucous membrane of the lip was excised and a mucous membrane graft applied to the raw surface. The result of the operation was very satisfactory.

Conclusions

A grafting knife has been described with which it is possible to take split mucous membrane grafts of reasonable dimension. Ten mucous membrane grafting cases have been discussed: seven to replace the conjunctiva of the eye and three the mucous membrane of the lip.

Acknowledgements

My thanks are due to Mr. O. M. Duthie and the Staff of the Royal Eye Hospital, Manchester, who first interested me in this subject and who kindly invited me to collaborate in the treatment of their cases. I gratefully acknowledge my indebtedness to Mr. Charles Whitbread, Senior Dental Technician, Maxillo-facial Department, Withington Hospital, Manchester, whose creative ingenuity and mechanical ability produced this knife from my embryonic idea. The photographs were taken by the Departments of Medical Illustration at the Manchester Royal Infirmary and Wythenshawe Hospital.

References

1. Kiehn, C. L. American Journal of Surgery, May 1954.
2. Barsky, A. J. Prin. and Pract. of Plastic Surgery.
3. Siegal, R. Arch. Ophthal., V.32, 1944.

Greffe de Muqueuse. Randell Champion

L'auteur a fait construire un canif de greffe de Humber miniature (large de 1 centimètre) avec une lame de rasoir pour prélever des couches de greffe muqueuse.

Les greffons peuvent être prélevés au niveau des lèvres et de la joue en tendant la muqueuse par l'insertion de 6 sutures à la soie sur le rebord vermillon et en exerçant une pression du côté cutané soit à l'aide d'une spatule métallique soit à l'aide des doigts.

Les 9 cas réussis de greffe de muqueuse comportant 6 cas ophtalmologiques pour traitement de symblépharon, de décollement essentiel de la conjonctive, de catarrhe printanier et de contraction de l'orbite oculaire. Les 3 cas de perte de la muqueuse labiale relevèrent d'un traumatisme.

Le canif ici décrit peut être utilisé pour le prélèvement de petites greffes dermo-épidermiques. Le prototype a été construit avec la collaboration de John Weiss et Son Ltd 287 Oxford Street, London, W.1, chez qui on peut se le procurer. On utilise comme lame de rasoir la "pal injector razor blade."

Schleimhauttransplantation. Randell Champion

Ein Miniatur Humbey Transplantationsmesser (1 cm breit) bei Verwendung einer Rasierklinge ist von dem Autor angegeben worden, um Spaltlappen aus der Schleimhaut zu entnehmen.

Die Transplantate können von den Lippen oder von der Wange entnommen werden, indem man die Schleimhäute durch sechs am Lippenrotrand angelegte Seidennähte spannt und einen Druck auf die Haut mit Metallspateln oder mit den Fingern ausübt.

Die neun erfolgreichen Spaltschleimhauttransplantationen umfassen 6 ophthalmologische Fälle zur Behandlung von Symblepharon, essentieller Schrumpfung der Conjunctiva, Frühlingskatarrhe und Schrumpfung der Augenhöhle. Drei Fälle von Schleimhautverlust der Lippen waren durch Trauma verursacht.

Dieses Messer kann zur Entnahme von kleinen Spalthautlappen benutzt werden. Das Modell wurde in Zusammenarbeit mit John Weiss & Son, Ltd., London W.1, gemacht, wo das Messer erhältlich ist. Die "pal injektor" Rasierklinge wurde benutzt.

Injerto de Membrana Mucosa. *Randell Champion*

El autor ha diseñado una cuchilla miniatura de Humbey de anchura de un centímetro utilizando navaja de rasurar para tomar injertos intermedios de membrana mucosa.

Los injertos pueden tomarse de los labios o de las mejillas haciendo que la membrana mucosa se encuentre tensa mediante la inserción de 6 suturas de seda en el borde bermellón y el hecho de ejercer presión en el lado cutáneo con una espátula de metal o con los dedos.

Los 9 casos a que se refiere el autor incluyen 6 oftálmicos para el tratamiento del simbléfaron, contracción esencial de la conjuntiva, catarro de primavera y cavidad orbitaria contraída.

En 3 casos de pérdida de membrana mucosa ocasionada por trauma se hace también el tratamiento.

Esta cuchilla puede ser utilizada para tomar pequeños injertos intermedios de piel.

El primer cuchillo fué ejecutado con la cooperación de John Weiss & Son, 287 Oxford Street, London W.1., de quien puede obtenerse el cuchillo el inyector de navajas *Pal* puede utilizarse.

VI

EAR

Reconstruction of the Auricle with Diced Cartilage Grafts.

LYNDON A PEER,* M D, *Newark 2, N J, U S A*

Although reconstruction of an auricle is admittedly one of the most difficult problems facing the plastic surgeon, developments in the field during the past fifteen years have resulted in a general improvement as regards post-operative results The techniques used by different surgeons may appear somewhat diverse, but actually the basic principles are quite similar In all auricle construction a framework must be provided for the new auricle in the region of the absent ear and this framework must be covered with skin which, to an acceptable degree, conforms to the external contour of the framework Transference of the earlobe, which fortunately is usually present, into normal relationship with the skin-covered framework, and the transplantation of skin to cover the posterior surface of the new auricle are standardized procedures

Unfortunately, after this has been accomplished, some hairbearing scalp skin is usually present on the upper portion of the new auricle and a bald or hairless area of skin is seen above the auricle if an Esser Inlay has been used A hairless Wolfe graft from behind the normal ear or from the patient's clavicle may be used to replace the hairbearing skin on the new ear and hairbearing scalp flaps may be brought down to substitute for the bald area above and behind the ear

In Centers where large numers of auricles are reconstructed the main difference in technique is in the type of material or tissue used for structural support of the auricle In general, these consist of autogenous rib cartilage, preserved or fresh homogenous cartilage, preserved meniscus cartilage as a homograft, a composite structure of autogenous and homogenous cartilage and bone, or some sort of foreign body material such as the non-electrolite metals or polyethylene My own experience during the past twenty-two years with the reconstruction of about eighty auricles has been limited to the use of the patient's own autogenous rib cartilage and with preserved homogenous cartilage, either alone or in combination with autogenous cartilage I have not used fresh homogenous auricular cartilage as advocated by Sir Harold Gillies Experimental and clinical evidence indicates that fresh homogenous cartilage retains its structure about as well as preserved homogenous cartilage The auricular cartilage, however, has the exact structure of an auricle and it would be the ideal supporting material if it retained its cartilaginous structure over long periods of time

During the past thirteen years we have constructed some sixty-five auricles using diced cartilage grafts pre-formed in a perforated Vitallium ear mold Autogenous cartilage has been used whenever it is present in sufficient quantity In young children, however, and in some cases where both auricles are absent, preserved bank diced cartilage has been used to supplement the patient's own cartilage My experience with this method of reconstruction with a description of complications which may occur and the long-time post-operative results are presented in this communication

Diced cartilage grafts[1] consist of small segments of cartilage which can be packed or molded into any desired contour like wet grains of sand The term "diced" is descriptive but in practice the small segments were formed as flat

* St Barnabas Rehabilitation Center, Department of Plastic Surgery, Newark, N J

placed the mucous membrane On 14th February 1954 the previous split skin graft in the region of the mucous membrane of the lip was excised and a mucous membrane graft applied *to the raw surface The result of the operation* was very satisfactory

Conclusions

A grafting knife has been described with which it is possible to take split mucous membrane grafts of reasonable dimensions. Ten mucous membrane grafting cases have been discussed seven to replace the conjunctiva of the eye and three the mucous membrane of the lip

Acknowledgements

My thanks are due to Mr O M Duthie and the Staff of the Royal Eye Hospital Manchester who first interested me in this subject and who kindly invited me to collaborate in the treatment of their cases I gratefully acknowledge my indebtedness to Mr Charles Whitbread, Senior Dental Technician Maxillo-facial Department Withington Hospital Manchester whose creative ingenuity and mechanical ability produced this knife from my embryonic ideas. The photographs were taken by the Departments of Medical Illustration at the Manchester Royal Infirmary and Wythenshawe Hospital.

References

1 Kiehn, C L American Journal of Surgery May 1954.
2 Barsky A J Prin. and Pract. of Plastic Surgery
3 Siegal R. Arch Ophthal., V 32 1944.

Greffe de Muqueuse. Randell Champion

L'auteur a fait construire un canif de greffe de Humbey miniature (large de 1 centimètre) avec une lame de rasoir pour prélever des couches de greffe muqueuse.

Les greffons peuvent être prélevés au niveau des lèvres et de la joue en tendant la muqueuse par l'insertion de 6 sutures à la soie sur le rebord vermillon et en exerçant une pression du côté cutané soit à l aide d une spatule métallique soit à l aide des doigts

Les 9 cas réussis de greffe de muqueuse comportant 6 cas ophtalmologiques pour traitement de symblepharon, de décollement essentiel de la conjonctive, de catarrhe printanier et de contraction de l avéole oculaire Les 3 cas de perte de la muqueuse labiale relevéient d un traumatisme

Le canif ici décrit peut être utilisé pour le prélèvement de petites greffes dermo-épidermiques. Le prototype a été construit avec la collaboration de John Weiss et Son Ltd 287 Oxford Street, London W 1 chez qui on peut se le procurer On utilise comme lame de rasoir la "pal injector rasor blade"

Schleimhauttransplantation. Randell Champion

Ein Miniatur Humbey Transplantationsmesser (1 cm breit) bei Verwendung einer Rasierklinge, ist von dem Autor angegeben worden um Spalt lappen aus der Schleimhaut zu entnehmen.

Die Transplantate können von den Lippen oder von der Wange entnommen werden indem man die Schleimhäute durch sechs am Lippenrotrand angelegte Seidennähte spannt und einen Druck auf die Haut mit Metallspateln oder mit den Fingern ausübt.

Die neun erfolgreichen Spaltschleimhauttransplantationen umfassen 6 ophthalmologische Fälle zur Behandlung von Symblepharon essentielle Schrumpfung der Conjunctiva, Frühlingskatarrhe und Schrumpfung der Augenhöhle Drei Fälle von Schleimhautverlust der Lippen waren durch *Trauma verursacht*

Dieses Messer kann zur Entnahme von kleinen Spalthautlappen benutzt werden Das Modell wurde in Zusammenarbeit mit John Weiss & Son, Ltd London W 1 gemacht, wo das Messer erhältlich ist. Die "pal injektor" Rasierklinge wurde benutzt.

Injerto de Membrana Mucosa. Randell Champion

El autor ha diseñado una cuchilla miniatura de Humbey de anchura de un centímetro utilizando navaja de rasurar para tomar injertos intermedias de membrana mucosa.

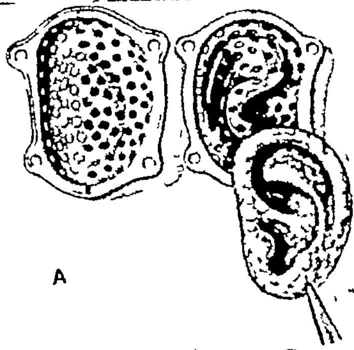
Los injertos pueden tomarse de los labios o de *las mejillas haciendo que la membrana mucosa se* encuentre tensa mediante la inserción de 6 suturas de seda en el borde bermellón y el hecho de ejercer presión en el lado cutáneo con una espátula de metal o con los dedos.

Los 9 casos a que se refiere el autor incluyen 6 oftálmicos para el tratamiento del simblefaron, contracción esencial de la conjuntiva, catarro de primavera y cavidad orbitaria contraída.

En 3 casos de pérdida de membrana mucosa ocasionada por trauma se hace también el tratamiento

Esta cuchilla puede ser utilizada para tomar pequeños injertos intermedios de piel

El primer cuchillo fué ejecutado con la cooperación de John Weiss & Son 287 Oxford Street London W.1 de quien puede obtenerse el cuchillo el inyector de navajas Pal puede utilizarse.



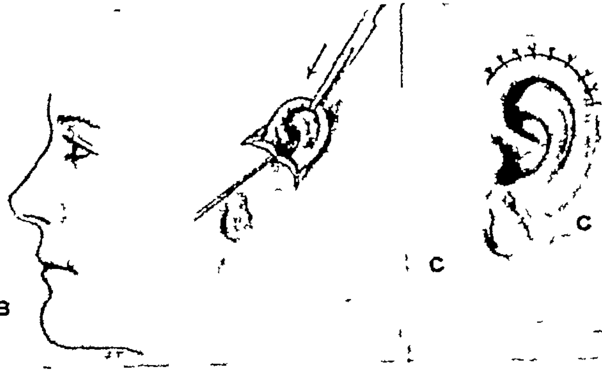


Fig 285 *Removal of Diced Cartilage Ear from Mold and Transplantation in Ear Region*
A The Vitallium ear mold has been removed from the abdominal pocket 5 months following burial The two halves of the mold have been separated and the diced cartilage ear framework removed from the mold B The diced cartilage ear framework is inserted in a previously delayed pocket beneath the skin in the ear region The framework is about 1inch higher than the normal ear to allow for subsequent sagging C The wound edges are sutured and a firm dressing applied to press the skin against the cartilage framework A drain may be inserted in the lower angle of the wound The drain is removed after 48 hours without disturbing the firm dressing holding the skin against the cartilage (Courtesy of Plastic and Reconstructive Surgery Vol 3, No 6, Pg 653, November, 1948)

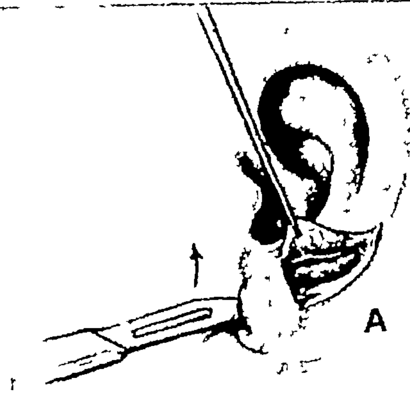




Fig 286 Adjustment of ear lobe into normal relationship with reconstructed auricle using the principle of the Z-plasty (Courtesy of Plastic and Reconstructive Surgery Vol 3, No 6, Pg 653, November, 1948)

importance than the particular method employed

Age at Operation

Although an external ear may be reconstructed at any age, it is desirable to begin the operations when the child is about four years old This allows the surgeon a sufficient time interval in which to form an auricle which is acceptable as regards contour, angle and lobe relationship before the child enters school

In total ear reconstruction the rib cartilage utilized to form the structural support of the auricle eventually protrudes in space and is covered by rather thin skin layers on both of its exposed surfaces (Split skin covering behind and probably a non-hairbearing Wolfe graft on part of the external surface) In children, especially, gradual reduction in size of the cartilage framework may occur, and if the surgeon attempts to carve out fine details in the cartilage structure, absorption will usually occur It is, therefore, expedient to wait until the child is older before completing final work on the reconstruction

In general, our present management is to transplant the diced cartilage framework beneath the skin in the region of the absent auricle and allow an interval of four months to elapse At the end of this period the surgeon can often determine whether absorption has taken place in the transplant If absorption has occurred, further operations are postponed until the child is older If absorption of the transplant does not occur (and this is usually the case), a split skin graft is introduced behind the diced cartilage framework and the lobe switched into normal relationship with the new auricle Practically all of our cases have some hairbearing scalp skin

shavings rather than cubes because the latter pack together without presenting sharp edges which may produce a prominence beneath the overlying skin.

Grafts of this type in a perforated Vitallium mold (or any tolerated mold) will conform to the shape of the container like wet sand in a sand mold.[2] When a perforated ear mold is filled with cartilage segments and buried beneath the patient's abdominal skin, connective tissue cells and blood vessels grow through the openings in the mold and fasten the separate segments together in the form of a solid plaque. If the mold remains in the recipient site for about five months the cartilage segments will usually be fastened together by mature connective tissue cells with strong collagenous fibers so that the cartilage can be removed from the mold as a solid ear structure. This cartilage framework may be inserted beneath the skin in the region of an absent ear to form the structural support for a new auricle.

Choice of Cartilage Grafts

Fresh autogenous cartilage is always the material of choice for transplantation. This is especially true in ear reconstruction because absorption or extrusion of homogenous heterogenous or inorganic frameworks after the Esser Inlay has been applied *will create an almost irreparable surgical problem.*

If homogenous cartilage grafts inserted to repair saddle nose or build out a receding chin are partly absorbed, the surgeon can always utilize an autogenous cartilage or bone graft to correct the deformity. When absorption or extrusion of an ear framework occurs after the auricle has been reconstructed, the new appendage contracts down to a small unsightly nubbin. One must then remove the Esser Inlay skin suture the contracted covering skin back into contact with the hairbearing scalp skin and begin the series of operations all over again.

Clinical and experimental evidence indicates that only autogenous cartilage should be used for reconstructing auricles in young individuals. Recent experimental work by Schofield[3] and Gibson and Davis[4] confirm our own observations[5] regarding the behavior of homogenous and heterogenous cartilage grafts in human tissues.

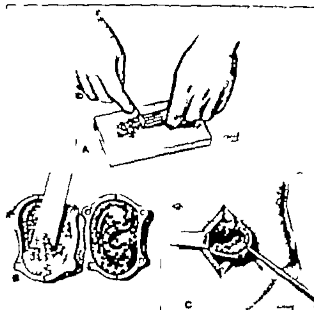


Fig. 284. *Formation of Ear Framework from Diced Cartilage Grafts Inserted In Vitallium Ear Mold.*

A. Rib cartilage removed from the right side of the patient's chest is diced into many small cartilage shavings. B. The "diced cartilage grafts" are introduced into each half of a perforated Vitallium ear mold. C. The two halves of the ear mold have been fastened together with Vitallium screws, pressing the diced cartilage grafts into the shape of an ear.

The mold containing the cartilage segments is inserted in a pocket beneath the patient's abdominal skin. During a period of months, blood vessels and connective tissue grow through the openings in the mold and fasten the separate cartilage segments firmly together in the form of an ear.

When both auricles are being reconstructed in a young child diced cadaver cartilage is used to supplement the child's own cartilage so that there will be sufficient cartilage to fill both the right and left ear molds. The operative procedures for the right and left ear are carried out simultaneously. Thus the total number of operations for reconstructing two auricles are the same as for reconstructing a single auricle.

The Vitallium ear molds are made by the Austenal Company of New York City. Medium and large-sized models are available to meet the general requirements of individual cases. (Courtesy of Plastic and Reconstructive Surgery. Vol 3 No 6, Pg. 653 November 1948.)

The choice of autogenous cartilage for the reconstruction of an auricle is much more important than the particular technique used by the surgeon. *Satisfactory external ears can be formed by methods other than the diced cartilage technique.* The experience of the surgeon and the use of autogenous cartilage is of more

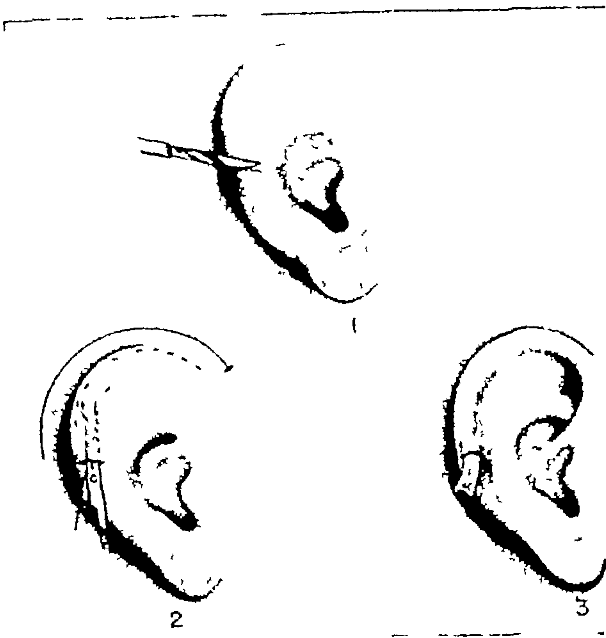


FIG 289 A curved cartilage transplant may be utilized to give additional height to the auricle or to emphasize the helix

slightly above normal and will learn to speak rather late in a somewhat toneless voice We have found that the quality of speech in these bilateral cases is greatly improved if the children can be induced to use a hearing aid

A normal drum membrane is never present in patients with meatal atresia, and operations to provide skin-lined tubes in the canal region in

crura It may be necessary to remove all cartilage in the depth of the concha D The dissected flap of skin will be larger than is required to snugly cover the raw defect This permits excision of hairbearing skin on the upper portion of the skin flap

Mattress sutures are inserted through the posterior surface of the auricle to draw the free margin of the skin flap into the cartilage groove or into actual contact with the deep surface of skin lining the back of the auricle E Mattress sutures tied on posterior surface of auricle The upper free margin of skin is not sutured because it tends to give a very natural appearance to the helix when allowed to heal without suture

Additional prominence can be given to the tragus by rotating a cone of skin upward and backward

It is wise to avoid the creation of minute detail in a reconstructed ear When the ear looks right leave it alone

Any remaining hairbearing skin is removed by the Ferris Smith principle of multiple excision or Wolfe graft substitution (Courtesy of Plastic and Reconstructive Surgery Vol 3, No 6, Pg 653, November, 1948)

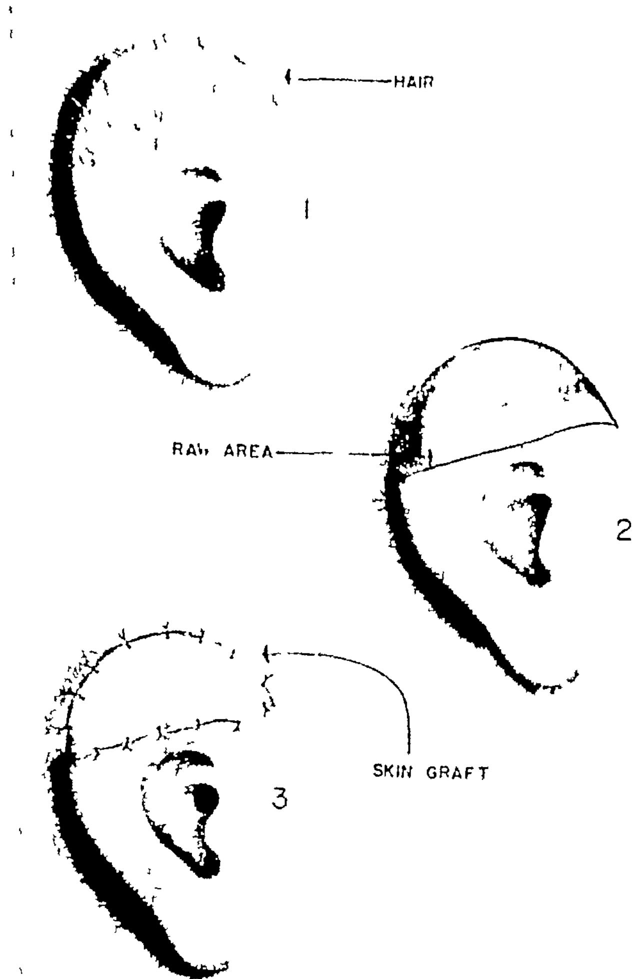


FIG 290 Hairbearing skin on the external surface of the auricle is replaced by hairless full-thickness skin removed from the normal ear or from the area above the clavicle

the hope of exposing a normal drum membrane are useless procedures

The acuity of hearing in patients with bilateral meatal atresia seems to be rather variable Auditory perception within the conversational range can usually be increased by making a

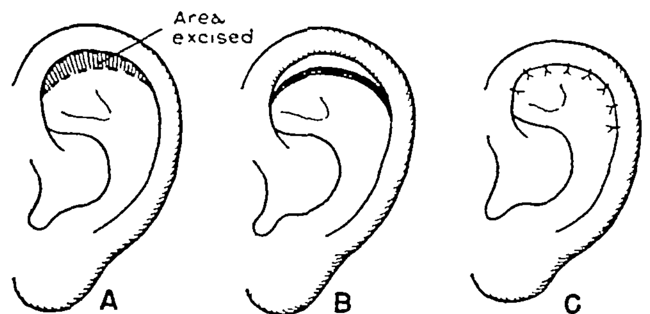


FIG 291 The height of the reconstructed auricle or that of the normal auricle may be reduced by excising a complete segment of cartilage and skin The two auricles must match in height as well as angle

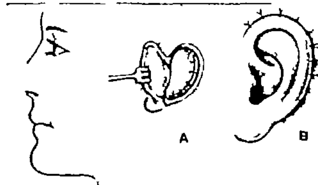


Fig 287 Grafting Posterior Surface of Auricle and Raw Scalp Surface with Split Skin Graft

A The diced cartilage framework is dissected free from the temporal fascia and periosteum of the temporal bone A split skin graft sutured over a dental stent mold is inserted behind the new auricle to cover the back of the diced cartilage framework and the raw scalp surface B The auricle is sutured over the dental stent mold which is covered with split skin graft. After about 7 days the dental stent is removed. The split skin graft covers the raw scalp area and the posterior surface of the new auricle permitting the latter to stand out at an angle from the side of the head The degree of protrusion and height of the reconstructed auricle must be adjusted to conform with the normal ear on the opposite side of the head. (Courtesy of Plastic and Reconstructive Surgery Vol 3 No 6 Pg. 653 November 1948)

covering the upper part of the reconstructed ear This is removed and replaced by a hairless Wolfe graft taken from the posterior portion of the normal ear or from the area above the clavicle.

In young children we do not turn back a flap and deepen the concha region. In older children and adults this is often the final step in auricle reconstruction, together with a z plasty to replace the hairless split graft above and behind the auricle with hairbearing scalp skin

The Hearing

The internal ear develops earlier and separately from the middle and external ear which develop together Congenital anomalies of the external ear are therefore often associated with deformities of the middle ear The internal ear however is usually normal in these cases, so that patients with absence or deformity of the auricle associated with meatal atresia have a normal bone conduction on the side of the deformity

Children with bilateral meatal atresia will hear (through bone conduction) a voice raised

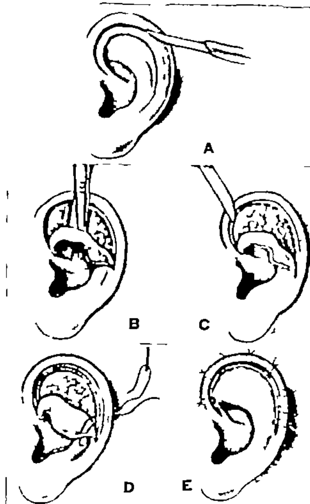


Fig 288 Final Trimming Operation to Sharpen Helix Increase Depth of Concha and Canal Region and Remove Hairbearing Skin. (May be done in one or two stages depending on abundance of circulation in skin.)

The contours of the reconstructed ear will not be as distinct as is indicated on this drawing due to the thickness of the covering skin, the formation of fibrous tissue beneath the skin and compression of the cartilage against the rigid skull bone. A An incision is made through the skin covering of the helix down to the diced cartilage framework of the ear This incision should reduce the width of the helix by about ½ Most of the hairbearing skin will be located below this incision. B The skin is dissected from the underlying diced cartilage framework over the scapha and well down into the depth of the concha. C An incision is made deeply into the cartilage and sufficient cartilage is removed to reduce the width of the helix and increase its prominence It may be necessary to carry this incision down to the skin covering on the posterior surface of the auricle and remove a solid wedge of cartilage This will allow the cartilage rim of the helix to roll downward producing a very normal effect.

Cartilage and fibrous tissue are widely removed in the region of the concha leaving prominent ridges to accentuate the anterior and inferior

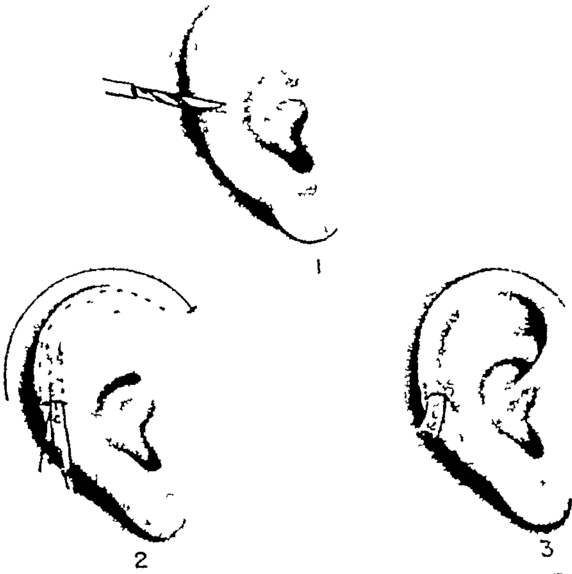


FIG 289 A curved cartilage transplant may be utilized to give additional height to the auricle or to emphasize the helix

slightly above normal and will learn to speak rather late in a somewhat toneless voice We have found that the quality of speech in these bilateral cases is greatly improved if the children can be induced to use a hearing aid

A normal drum membrane is never present in patients with meatal atresia, and operations to provide skin-lined tubes in the canal region in

crura It may be necessary to remove all cartilage in the depth of the concha D The dissected flap of skin will be larger than is required to snugly cover the raw defect This permits excision of hairbearing skin on the upper portion of the skin flap

Mattress sutures are inserted through the posterior surface of the auricle to draw the free margin of the skin flap into the cartilage groove or into actual contact with the deep surface of skin lining the back of the auricle E Mattress sutures tied on posterior surface of auricle The upper free margin of skin is not sutured because it tends to give a very natural appearance to the helix when allowed to heal without suture

Additional prominence can be given to the tragus by rotating a cone of skin upward and backward

It is wise to avoid the creation of minute detail in a reconstructed ear When the ear looks right leave it alone

Any remaining hairbearing skin is removed by the Ferris Smith principle of multiple excision or Wolfe graft substitution (Courtesy of Plastic and Reconstructive Surgery Vol 3, No 6, Pg 653, November, 1948)

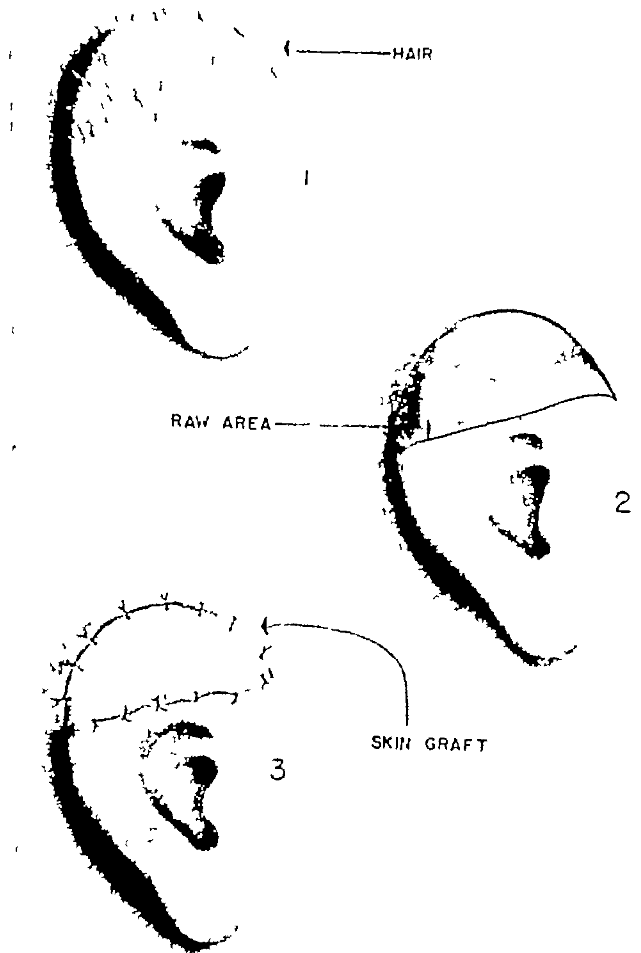


FIG 290 Hairbearing skin on the external surface of the auricle is replaced by hairless full-thickness skin removed from the normal ear or from the area above the clavicle

the hope of exposing a normal drum membrane are useless procedures

The acuity of hearing in patients with bilateral meatal atresia seems to be rather variable Auditory perception within the conversational range can usually be increased by making a

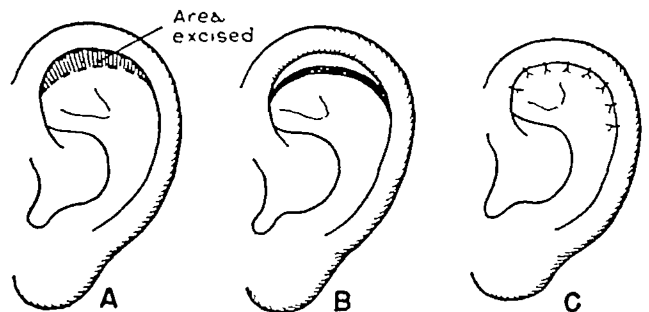


FIG 291 The height of the reconstructed auricle or that of the normal auricle may be reduced by excising a complete segment of cartilage and skin The two auricles must match in height as well as angle

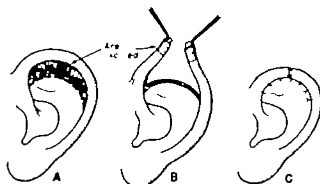


FIG. 292 Larger discrepancies in the height and width of the auricles may be corrected as shown in A, B and C This is an old procedure which in our hands has been very sati factory If the reconstructed auricle is small the normal ear may be reduced so that both ears are symmetrical It is much easier to reduce an auricle than to increase its height or width

skin-covered opening into the antrum in selected cases. Our otologist has not found it necessary to do the fenestration procedure

LATE RESULTS

In our hands the pre-formed diced cartilage framework has been satisfactory in about 80 per cent of sixty five reconstructed auricles The failures or unsatisfactory results were often due to poor management and these with few exceptions occurred in the first forty cases operated upon Nine out of ten cases completed in the past year have been satisfactory In one patient the mold became infected due to the presence of a broken-off piece of rubber drain inadvert ently left in the transplantation site.

A critical evaluation of the successfully reconstructed auricles by the Vitallium mold method demonstrated that patients and parents were generally pleased with the results. Children ad justed well in school and were accepted by their classmates as members of the group Parents and older patients often desired to have more refined details made in the reconstructed ear but none of our successful cases were sorry that the ear had been made in spite of the multiple operations and hospital and medical expenses

From the surgeon's standpoint the recon structed auricles in unilateral cases were generally satisfactory in contour angle and lobe relationship with the normal ear at conversa tional distances. Closer inspection always demonstrated somewhat thick structure with an

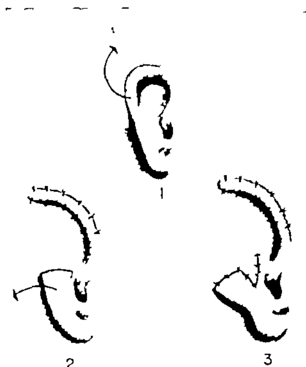


FIG 293 It is important to use all portions of the auricle which are present. When a small concha and helix are available we detach the helix and suture it at a higher level so that good relationship is established with the normal ear on the opposite side The small concha is widened by the ever-useful Z-plasty and the exposed edges of auricular cartilage are buried Thus the area of absent cartilaginous support is outlined by the transplanted helix above and the upper part of the ear lobe below Diced cartilage grafts or a single segment of cartilage is later introduced to provide cartilaginous support.

absence of fine and accurate crura and concha outline. Our bilateral cases also were more satisfactory in the contour-angle-lobe relationship than detailed and refined reproduction of normal auricle structure

The most satisfactory auricles were the par tial reconstructions where a distinct but small concha was present often associated with an ear canal and normal drum membrane

CONCLUSIONS

Reconstruction of an auricle should be under taken with caution *but not with excessive skepticism.* Perhaps the post-operative results are somewhat similar to those obtained in complete bilateral harelip repair as regards the wide nos trils, short columella and flattened nasal tip The constructed auricles, in most instances also show obvious deficiencies in fine structure but

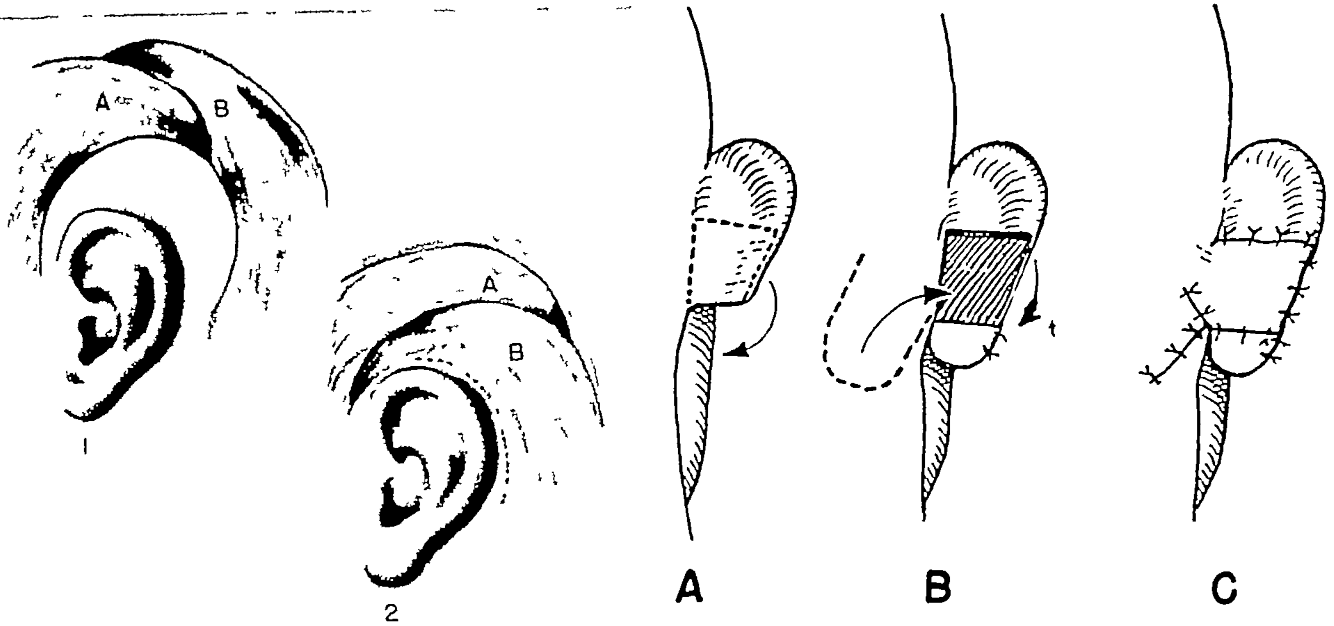


FIG 294 A Z-plasty to replace the exposed hairless split skin graft with hairbearing scalp skin is often the final procedure in auricle reconstruction

FIG 295 Fortunately an ear lobe of some sort is usually present in congenital deformities of the auricle and it can be brought into satisfactory relationship with the new ear framework When the lobe is absent it may be formed, as indicated in the above diagram, providing a Wolfe graft has been used for posterior coverage Another satisfactory method is simple elevation of a skin tongue in the area of the absent lobe with a rotated posterior skin flap for coverage The principle of shifting two skin flaps together or a roll-down of skin and a shift are very old surgical procedures These shifts, together with the Z-plasty and tongue and notch principle for free border surfaces, are all extremely valuable in auricle reconstruction

who will deny that both operative procedures are justified, if the patient with an auricular deformity and the child with bilateral harelip are both benefited in their integration and self assurance

There is a tendency for plastic surgeons who are experienced and critical to become discouraged by the numerous compromises necessary in total ear construction These men are sometimes influenced to give up the use of relatively



FIG 296 Patient with complete auricle reconstruction on the left side some years after final operation This case is typical of the average results obtained by the Vitallium ear mold method up until the past two years At conversational distance the auricle is reasonably acceptable but closer inspection shows a somewhat heavy structure with a hairless split skin covered area above and behind the ear



FIG 207 Patient with complete auricle reconstruction in which the detail of ear structure is more normal and less bulky At this time we were not lowering the hairline and the hairless split skin graft is evident above and behind the reconstructed auricle

dependable autogenous cartilage as a supporting framework and utilize some form of inorganic material which can be accurately shaped before burial Unfortunately these foreign materials immediately beneath the skin appear to elicit more host antibody reaction than similar foreign transplants in the orbit or more deeply implanted as substitutes for absent segments of blood vessels. There are no long term reports of satisfactory auricles in which inorganic materials were used for the ear framework.



FIG 208 Close-up photograph of a recent case with complete auricle reconstruction demonstrating acceptable skin conformation to the diced cartilage framework The picture was taken shortly after a Z-switch to correct notching in the boy's earlobe At conversational distance the imperfections seen in this photograph are less noticeable and the auricle is among our 15 most satisfactory complete ear reconstructions with the preformed diced cartilage framework method The hairline was lowered by a Z-switch

This is not to state that experimental work with foreign implants should not be continued More precise knowledge regarding the rejection of homo- and hetero-cartilage grafts and successful means to prevent this host reaction may be applied to the rejection of inorganic implants. Until this time arrives however the plastic surgeon should continue to use autogenous supporting tissue for reconstructing auricles especially in children who have a long life expectancy Homogenous cartilage may be used in older patients when it is not deemed advisable to remove the patient's costal cartilage but heterogenous cartilage from the Ox or Sting Ray is still in the realm of experimental surgery When diced cartilage is used a mixture of autogenous and homogenous shavings may actually be desirable because gradual absorption of the ho-



FIG 209 (top) Sub-total ear reconstruction on right side as indicated in Figure 203 with diced cartilage (Bottom) Sub-total ear reconstruction on right side as indicated in Figure 203 with diced cartilage

mogenous cartilage tends to thin out the ear structure somewhat

The possibility of removing the chondrocytes from cartilage and utilizing the matrix as a sort-of "ideal homograft or heterograft" material without antigen qualities is fascinating but illusive Attempts to synthesize a cartilage matrix material or to inject substances which cause the host tissues to form cartilage have not been successful

Workers in our Clinic are currently attempting to separate the chondrocytes from the matrix by a different approach and this may some day be accomplished Homogenous and even heterogenous cartilage matrix without cells might provide a valuable grafting material, assuming that the foreign cells rather than the matrix are the antigens that cause the production of hostile antibodies

References

1 Peer, Lyndon A Diced cartilage grafts Arch of Otolaryngology, 38 156, 1943
2 Peer, Lyndon A, M D Transplantation of tissues Baltimore Williams & Wilkins Company, 1955 1 137, Ref 21
3 Schofield, A L Brit J of Pl Surg, 6 26, 1953
4 Gibson, Thomas, and Davis, Brian Brit. J of Pl Surg, 6 4, 1953
5 Peer, Lyndon A, M D Transplantation of tissues Baltimore Williams & Wilkins Company, 1955
6 Peer, L A The fate of living and dead cartilage transplanted in humans Surg, Gyn & Obst 68 603-610, 1939



Fig 300 Sub-total ear reconstruction on right side as indicated in Figure 293 with diced cartilage One notes that more normal auricular structure is achieved when patients have even a small concha and a portion of the tragus present

Réconstruction du Pavillon de l'Oreille a l'Aide de Greffes Cartilagineuses en dés. Lyndon A Peer

Bien que la réconstruction du pavillon de l'oreille soit reconnue comme un des problèmes les plus difficiles auxquels doit faire face le chirurgien esthétique, les progrès en ce domaine au cours des 15 dernières années ont donné lieu à une amélioration générale en ce qui concerne les résultats post-opératoires Les techniques utilisées par différents chirurgiens peuvent sembler quelque peu différentes mais en réalité les principes de base sont tout à fait semblables

Au cours des 13 dernières années, l'auteur a construit environ 65 pavillons de l'oreille à l'aide de greffes cartilagineuses en dés préformées dans un moule à oreille en vitalium perforé Chaque fois qu'il existait en quantité suffisante on a eu recours à du cartilage autogène Toutefois chez le jeune enfant et dans quelques cas avec absence des deux pavillons de l'oreille, on a utilisé du cartilage conservé pour remplacer le propre cartilage du malade Des photographies et des dessins illustrent l'expérience de l'auteur avec cette méthode de reconstruction, le tout étant complété par la description des complications qui peuvent survenir et par le résultat postopératoire très éloigné

Wiederherstellung der Ohrmuschel mit Transplantation von Knorpelschnitzeln. Lyndon A Peer

Obwohl die Wiederherstellung der Ohrmuschel zugegebenermassen eines der schwierigsten Probleme ist, das dem plastischen Chirurgen entgegentritt, hat die Entwicklung auf diesem Gebiet wahrend der letzten 15 Jahre hinsichtlich der postoperativen Ergebnisse eine allgemeine Verbesserung gebracht Die von den verschiedenen Chirurgen angewandten Methoden mogen etwas verschiedenartig anmuten, dennoch sind die Grunprinzipien tatsachlich ziemlich ahnlich

Wahrend der letzten 13 Jahre habe ich etwa 65 Ohrmuscheln wiederhergestellt, bei denen ich Transplantationen von Knorpelschnitzel angewandt habe, die in perforierten Vitalium-Ohrformen vorgeformt wurden Wenn immer in genugender Menge vorhanden, wurde autogener Knorpel benutzt Bei kleinen Kindern jedoch und in einigen Fallen, wo beide Ohrmuscheln fehlten,

wurden konservierte Knorpelschnitzel zur Ergänzung des Eigenknorpels des Patienten benutzt

Meine Erfahrungen mit dieser Methode der Wiederherstellung zusammen mit einer Beschreibung der möglichen Komplikationen und die über lange Zeit beobachteten postoperativen Ergebnisse werden durch Photographien und Zeichnungen demonstriert.

Reconstruccion de la Oreja con Injerto Cuadriculado de Cartilago. Lyndon A Peer

Aunque se ha admitido que la reconstrucción de la oreja es uno de los problemas más difíciles que afronta el Cirujano Plástico los progresos en éste campo durante los últimos quince años han dado como resultado una mejoría general en lo que respecta a los resultados post-operatorios Las técnicas usadas por diferentes cirujanos son más o menos diversas pero en la actualidad los principios básicos son bastante similares

Durante los ultimos 30 años he reconstruído como 65 orejas usando injerto de cartílago cuadriculado pre-formado en un molde de vitalium auricular Se ha usado cartílago autógeno cuando hay suficiente En niños y en casos de pérdidas de las dos orejas se ha usado cartílago del banco para substituír el propio Mi experiencia en éste tipo de reconstrucción y la descripción de complicaciones posteriores y los resultados tardíos del post-operatorio se muestran en fotografías y dibujos.

Reconstruction of Auricle Following Traumatic Loss. Morton I Berson, M D *New York N Y, U S A*

The complicated structural and contoural framework of the external auricle makes replacement extremely difficult Various modern and more radical technics have recently been used but still the best results obtained have been by modifications and more esthetic improvements of the standard procedures

Before the complete reconstruction is undertaken, the traumatic area must be free from any infection and completely healed. Also if there are any remaining small sections of cartilage or skin over the site of the auricle they should be removed and discarded.

Operation

First stage. A pre-operative model made of the patient's normal ear is reversed and placed along the posterior auricular region, above and behind the external acoustic meatus corresponding to the position of the auricle on the opposite side. With brilliant green dye a line is drawn circumscribing the margin of the model to delineate the location of the future auricle An incision is made through the skin over the marking and the flap is lifted from the cranial periosteum up to the external auditory canal

The necessary large section of cartilage for the supporting framework of the auricle is acquired as follows The cartilage is exposed through a vertical incision 10 cm long and 5 cm from the mid-sternal line so that the middle of the incision is over the seventh costal cartilage The incision is deepened to the rectus muscle which is separated in the direction of its fibers and the seventh eighth and ninth costal cartilages are exposed at their sternal junction. The model ear is placed on the exposed cartilage and outlined with a knife on the perichondrium. By means of a periosteal elevator the perichondrium is undermined around and under the surface of the ribs for the desired distance. The ends of the cartilage are cut through and the section of cartilage is removed. The chest wound is closed in layers and a dry gauze dressing is applied, held firmly by strips of adhesive. The remaining perichondrium is completely stripped from the graft and the pre-operative model (Fig 301) is used as a guide in molding the structural convolutions on the cartilage graft The graft is then inserted (Fig 301 bottom left) into the prepared pocket and the flap is closed, under tension by interrupted silk sutures By means of a stent mold the skin is pressed into the convolutions of the new auricular cartilage, and a snug mastoid bandage is applied and left in place for ten days In the same stage a tube pedicle about 14 cm long and 1½ cm in diameter is raised from the side of the neck to be used to form the helix.

Second stage—four weeks later A semilunar incision 1½ cm is made through the skin to the periosteum, posterior and parallel to the rim of the implanted cartilage. The skin-cartilage flap is then raised as far as the external acoustic meatus, care being taken not to cut into or expose the cartilage. The raised flap is now larger than the desired ear so that the excess skin can be used for the construction of the antihelix. This excess skin flap is curled and sutured on itself at the rim of the implanted cartilage to form the shape of the antihelix corresponding to that of the model ear The

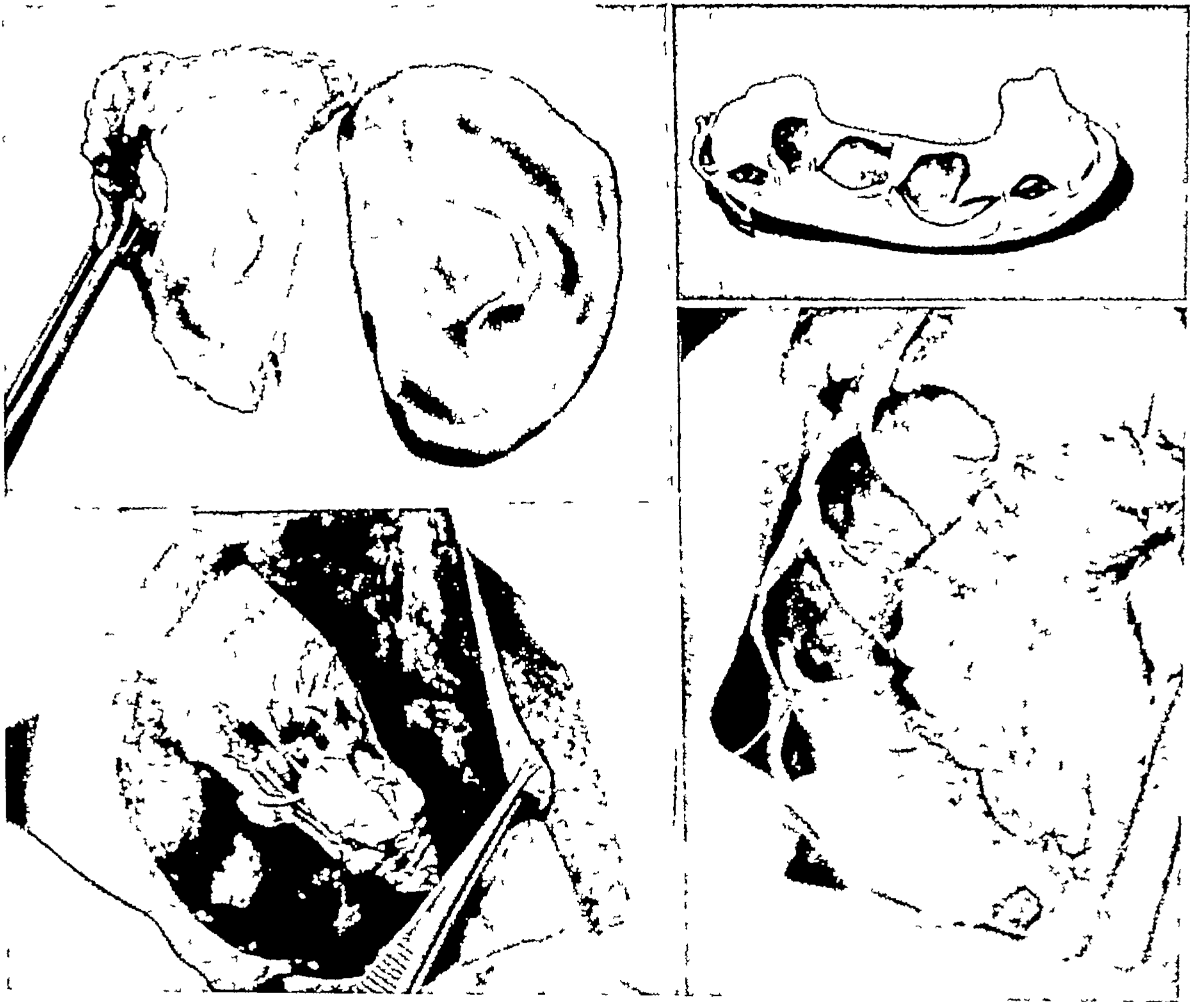


FIG 301 (top left) Cartilage graft carved to mirror-image model of opposite ear (Bottom left) Modelled rib-cartilage graft inserted into prepared pocket (Top right) Skin graft, with raw surface exposed, wrapped around stent-model (Bottom right) Skin flap curled and sutured on itself to help form antihelix and stent, covered by skin graft, placed under prepared flap

amount of skin necessary to cover the raw surface at the posterior auricaular region is marked on transparent lint This pattern is placed over the thigh and a ¾ thickness skin graft, 0 020 of an inch in thickness, is obtained with the dermatome The skin graft (Fig 301, top right) with the raw surface exposed, is wrapped over the stent-mold, modeled to fit the angle of protrusion of the normal ear, and held in place by sutures crossed above the stent at appropriate points The stent, wrapped in the skin, is then placed under the prepared flap and pressed into the convolutions in order to favor the take (Fig 301, bottom right) The margins of the skin graft are approximated by means of interrupted silk sutures to the posterior margins of the newly formed antihelix, and also to the skin borders along the neck A firm mastoid dressing is applied over the ear for immobilization At this time the distal end of the tube pedicle is detached and reattached to assure good circulation

Third stage After ten days the exposed excess skin over the stent, which is now parchment-like, is trimmed and the stent is removed, thus leaving the back of the auricle and the neck lined with a ¾ thickness skin graft The auricle, with the convolutions of the concha and antihelix, assumes a raised position at the side of the head The distal end of the tube pedicle is now detached and sutured into the upper part of the constructed ear to form the helix

Fourth stage Two weeks later the proximal end of the tube pedicle is severed, opened and attached to the outer margin of the constructed auricle thereby completing the helix and the lobule of the ear (Fig 302)

SUMMARY

The pre-operative model and the stent-mold act as a guide in shaping an auricle which ap-

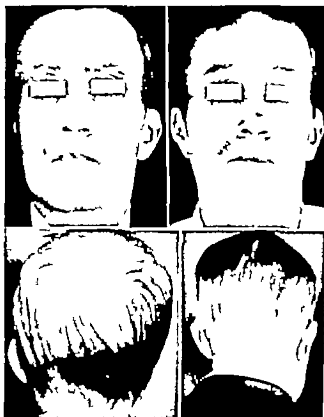


FIG. 302. Before and after reconstruction of auricle following traumatic loss. Anterior and Posterior views.

pears normal in size. By using one thick, firm section of autogenous costal cartilage the shape of the convolutions is more successfully maintained. The excess skin flap which is curled and sutured on itself at the rim of the implanted cartilage aids in forming the antihelix concha and part of the lobule corresponding to the model ear

REFERENCES

1. Aufricht, G Plastic & Recon. Surg., 2 297 306 1947
2. Berson, M I Amer J Surg 60 101 104 1943
3. Berson, M I Atlas of Plastic Surgery Grune & Stratton New York, 1948
4. Byars L T and DeMere M Plastic & Recon. Surg., 5-66-74 1950
5. Converse J M Plastic & Recon. Surg 5 148-156 1950
6. Conway H. et al Annals of Surg., 128 226-239 1948.
7. Peer L. A Plastic & Recon. Surg 3 653-666 1948.
8. Steffensen, W H. Plastic & Recon Surg., 10 186-190 1952
9. Wickstrom O W., and Bromberg B E. Plastic & Recon. Surg., 13 204-209 1954.

Réconstruction du Pavillon de l'Oreille Après Perte par Traumatisme. MORTON I BERSON

Le modèle préopératoire et le moule en stent guident pour façonner le pavillon qui acquiert un aspect normal quant à la taille L'utilisation d'un cartilage costal autogène et épais permet de maintenir d une meilleure façon les circonvolutions. L excès de lambeau cutané qui est ourlé et suture à lui-même sur le bord du cartilage implanté aide à former l antihelix la conque et une partie du lobule en accord avec l oreille modèle

Wiederherstellung der Ohrmuschel nach Traumatischem Verlust. MORTON I. BERSON

Das postoperative Modell und die Stentsform dienen als Anhalt bei der Formung einer Ohrmuschel von normaler Grösse Durch die Verwendung von einem dicken festen Stück autogenen Rippenknorpels kann die Form der Windungen zuverlässiger erhalten werden. Der überschüssige Hautlappen, der gedreht und am Rande des implantierten Knorpels an sich selbst festgenäht wird ist eine gute *Hilfe* bei der dem *Modellohr* angepassten Formung des Anthelix, der Muschel und eines Teiles des Ohrläppchens

Reconstrucción de una Oreja Despues de Pérdida Traumática MORTON I. BERSON

El modelo pre-operatorio y el molde en yeso actuan como guía en la forma de la oreja que puede aparecer normal en medida Usando una sección de cartílago costal gruesa y firme de los repliegues es mantenida con mas éxito El exceso de piel del tubo es curvado y suturado a si mismo en el borde del cartílago implantado ayudando a formar el antihélix, la concha y parte del lóbulo correspondientes al modelo de oreja

---

Reconstruction of the Absent and Deformed Ear (Congenital Aplasia and Microtia) WILHELM LOENNECKEN M. D *Chief of the Dept of Plastic Surgery at Rikshospitalet Oslo Norway*

We know there are many plastic surgeons, who don t believe in reconstructed ears. They find the results poor—and not worth all the work and patience which undoubtedly is necessary for this difficult task. These surgeons therefore favour artificial (prosthetic) ears.

Unfortunately there is no one in Oslo who *can make an ear prosthesis to our satisfaction* and then almost every patient sent to us has preferred to have his own ears. These people couldn t stand the thought of having something

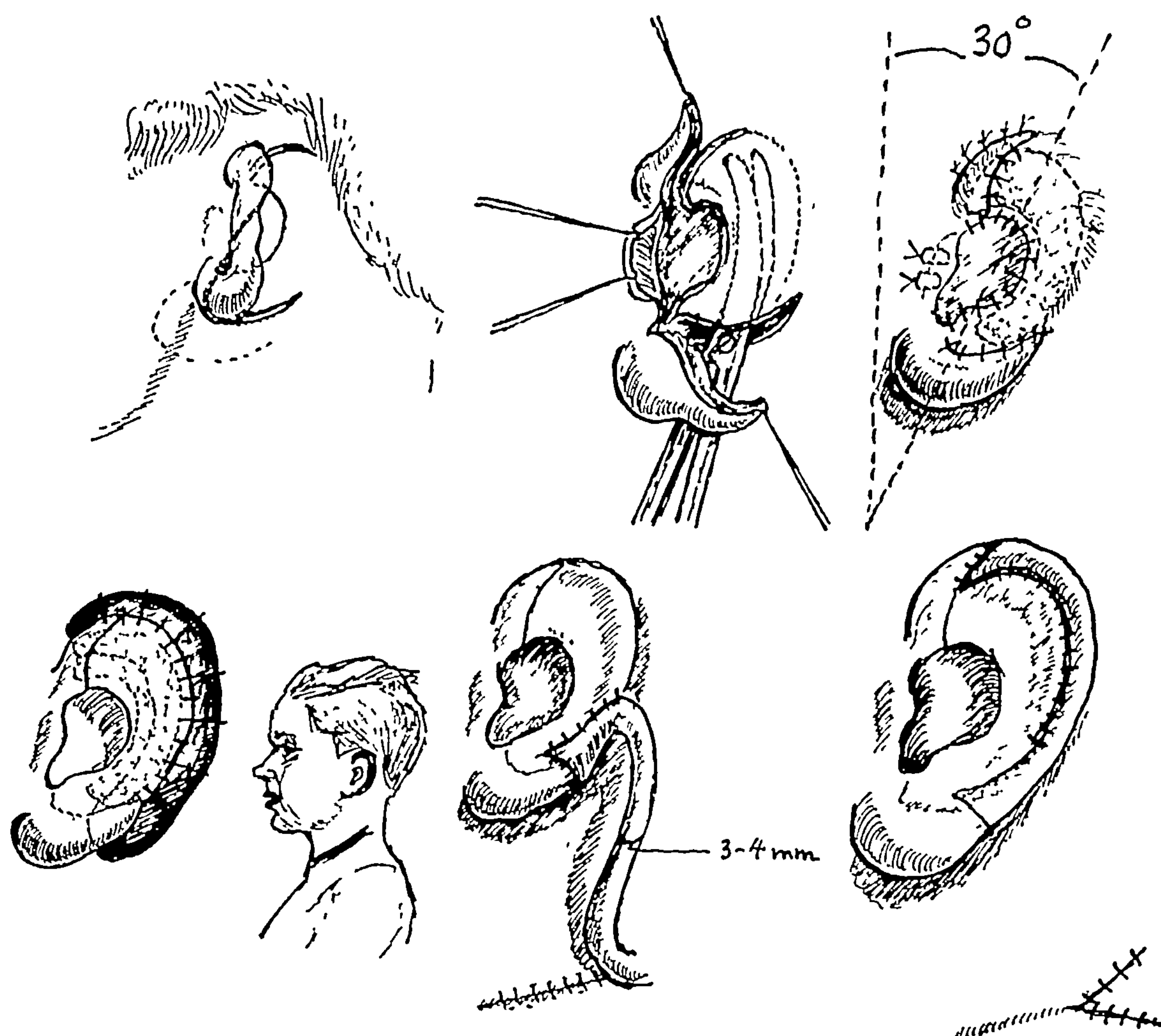


FIG 303 (top left) First incision lines The vertical skin fold is divided obliquely into two narrow based flaps (the blood supply is very good) The outline of the conchal hollow is marked as well as the insertion for the superior (crux helix) flap and the inferior (lobule) flap (Top center) The superior and inferior flaps—and also a middle flap (the skin covering the area of the conchal hollow to be) which is rolled on itself to make a tragus Undermining of the skin for the cartilage implant is going on The undermining stops a few mm from the border of the cavum conchae, leaving the skin well attached here (Top right) Stage I finished The flaps are sutured in place The cartilage implant lies in its pocket The conchal hollow is covered with a free graft The ear is leaning 30° backwards (Bottom left) Stage II Pinna is raised and the area behind grafted The sutures knotted over a gutta-percha mold When lifting the pinna the dissection is not carried on farther than a few mm from the anterior edge of the cartilage The tubed pedicle on the neck is raised (Bottom center) Stage III One end of the pedicle is freed and opened up and inserted just above the lobule (Bottom right) The rest of the pedicle has been freed and a segment of the circumference of the pedicle corresponding to the scarline cut away, the free border of the auricle is opened just a few mm, and the pedicle sutured in place

artificial hanging in the side of the head We therefore felt the necessity of working out a fairly safe and simple routine surgical method

The purpose of this paper is to give an accurate description of this method It is not original in any way (there is very little new under the sun!) but in our opinion it is a new and fairly easy combination of well-known tricks We haven't used the method more than a few years, so it must be understood that our experience as yet is very limited It has been a great encouragement to us that the results seem to improve with experience But still this is to be regarded as a preliminary report

The material consists of unilateral cases only It is rather strange that we haven't seen any congenital bilateral cases up till now The patients have all had good hearing in the normal ear Our problem has therefore been purely cosmetic—no attempt has been made to make

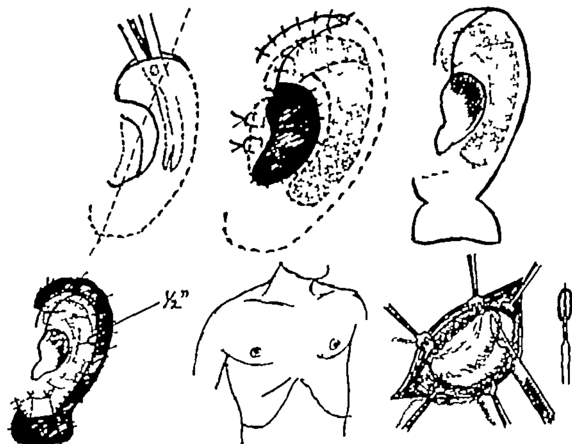


Fig 304 (top left) Shows incision lines when there is no rudimentary ear present. A narrow flap is cut for the anterior crux of helix The outlines of the planned ear are marked and undermining for the cartilage implant is taking place. (Top center) The flap is sutured in place. Two pieces of rib cartilage are put in place (one only not being sufficiently curved) Tragus is constructed and the conchal hollow covered with a skin graft (Top right) Stage II. Incision lines for raising the pinna and making a new lobule (Bottom left) The lobule has been established by turning in the flap fixing it by some mattress sutures and joining the edges by interrupted sutures Mold with free skin graft in place. (Bottom center and right) Line of incision at chest Cartilaginous rib arch exposed The knife cuts out half the thickness of the rib preserving the perichondrium (insert shows section of the rib and how it is divided The rib half curves naturally making a fine prominence for the helix)

an external auditory canal In the future we may also include that in the standard method, even in unilateral cases

In most of the cases there has been a kind of lobule and a vertical fold of skin present—representing the rudimentary auricle containing grossly deformed and useless cartilage.

To get a fairly satisfactory cosmetic result, one has to establish (1) a scapha (pinna) supported by sufficiently strong cartilage especially in the vertical direction (2) a cavum conchae (3) a tragus, (4) a lobule (5) a helix.

We believe that the most stable and reliable cartilage is autogenous rib cartilage, which is cut out as described below In our experience the maternal cartilage flattens out and does not show the contours which was the actual reason for using it. Besides it softens and does not support the ear properly And then one dislikes the idea of mutilating a normal ear even if the mother does not mind. Maybe she'll regret later when she sees the final result in the child.

Bovine cartilage we have discarded as it is nearly always attacked by body enzymes.

At *the first stage* the cavum conchae and tragus and lobule are established also the anterior crux of the helix if possible The cartilage implant is inserted under the skin in accurate position. The conchal hollow is excavated right down to the periosteum of the mastoid process, all deformed and useless cartilage being discarded, only useful pieces being left for the tragus and antitragus. The hollow is covered



Fig 305 Case 1 Beginning to end of first stage In this case the crux anterior to helix was not made Note the pleasing lobule, the well marked conchal hollow and correct axis of the new ear

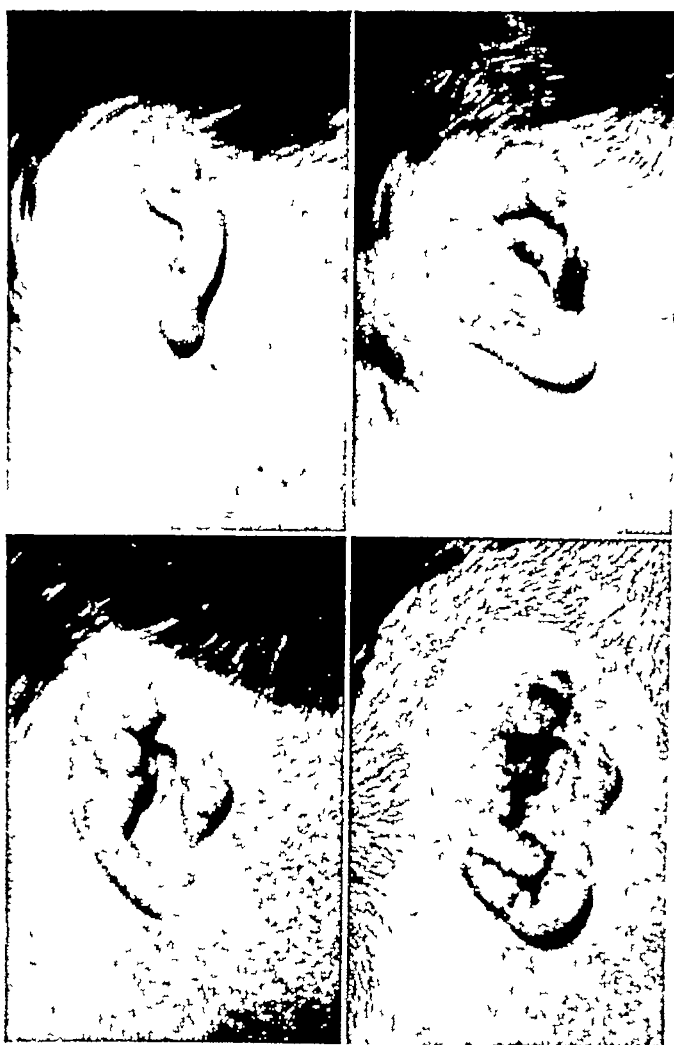


Fig 306 (top left) Before operation. (Top right) End of stage I Note anterior crux of helix, the lobe, the conchal hollow and the nicely curved cartilage under the skin

Case 3 (Bottom left) Before operation A more complicated deformity (Bottom right) End of stage I The tragus is located too far forward, and will be moved backwards later

with a free ¾ split skin graft or a Wolfe graft taken from the chest at the site of incision for the cartilage removal, an oval incision being used instead of a straight one

Special stress is laid on getting the correct superior-posterior inferior anterior axis of the new ear It should lean at least 30° backwards

The main hindrance to this is apparently the hairline We don't pay any attention to this Hairbearing skin can be substituted or depilation can be done as a preliminary step or at a later stage

We consider the first stage as the most important If everything is correctly placed at this first operation the battle has been won

The next stages may have their pitfalls, but nevertheless they are fairly simple routine It is the first design that counts

At *the second stage* (4-6 months later) the new pinna is lifted and adjacent raw surfaces covered with free ¾ split skin graft or a full-thickness Wolfe graft A delicate tubed pedicle (diam 3-4 mm) is raised at the neck just below

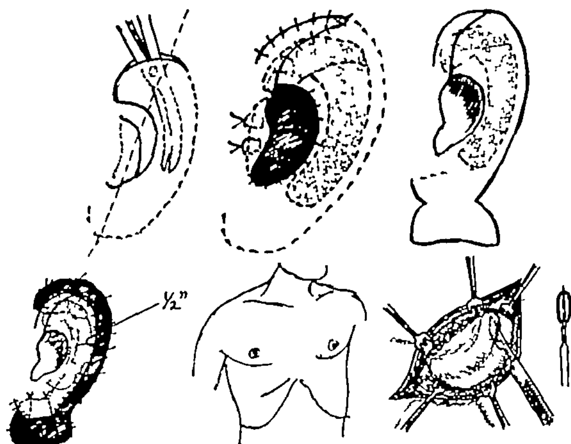


FIG 304 (top left) Shows incision lines when there is no rudimentary ear present. A narrow flap is cut for the anterior crux of helix The outlines of the planned ear are marked and undermining for the cartilage implant is taking place (Top center) The flap is sutured in place. Two pieces of rib cartilage are put in place (one only not being sufficiently curved) Tragus is constructed and the conchal hollow covered with a skin graft. (Top right) Stage II. Incision lines for raising the pinna and making a new lobule (Bottom left) The lobule has been established by turning in the flap fixing it by some mattress sutures and joining the edges by interrupted sutures. Mold with free skin graft in place (Bottom center and right) *Line of incision at chest Cartilaginous rib arch exposed The knife* cuts out half the thickness of the rib preserving the perichondrium (insert shows section of the rib and how it is divided The rib half curves naturally making a fine prominence for the helix)

an external auditory canal In the future we may also include that in the standard method even in unilateral cases

In most of the cases there has been a kind of lobule and a vertical fold of skin present—representing the rudimentary auricle containing grossly deformed and useless cartilage.

To get a fairly satisfactory cosmetic result, one has to establish (1) a scapha (prima) supported by sufficiently strong cartilage, especially in the vertical direction (2) a cavum conchae (3) a tragus, (4) a lobule (5) a helix.

We believe that the most stable and reliable cartilage is autogenous rib cartilage which is cut out as described below In our experience the maternal cartilage flattens out and does not show the contours which was the actual reason for using it. Besides it softens and does not support the ear properly And then one dislikes the idea of mutilating a normal ear even if the mother does not mind. Maybe she'll regret later when she sees the final result in the child

Bovine cartilage we have discarded as it is nearly always attacked by body enzymes

At *the first stage* the cavum conchae and tragus and lobule are established, also the anterior crux of the helix if possible. The cartilage implant is inserted under the skin in accurate position The conchal hollow is excavated right down to the periosteum of the mastoid process all deformed and useless cartilage being discarded, only useful pieces being left for the tragus and antitragus. The hollow is covered

Der erste Abschnitt entscheidet uber das endgultige Resultat

Bei dem zweiten Operationsakt wird die Ohrmuschel abgehoben, freie Hauttransplantation fur die angrenzenden Wundoberflachen Ein zierlicher Rundstiellappen wird unterhalb der Halsfalte gebildet Beim nachsten Akt wird der Rundstiellappen eingenaht, womit der Helix geformt ist

Reconstruccion de la Oreja Ausente o Deformada. Aplasia y Microtia Congenitas. WILHELM LOENNECKEN

El autor prefiere el cartílago costal autógeno como esqueleto para la nueva oreja (Hay una figura para ilustrar la obtención del implante) Se hace hincapié en la colocación correcta con el eje de la oreja formando un ángulo de trienta grados hacia atras

En el primer tiempo los pliegues verticales de la oreja (si esten presentes) son divididos oblícuamente, la mitad inferior (lóbulo) se lleva hacia adelante y hacia abajo, la mitad superior (crux anterior del hélix) es rotada hacia arriba (ver figura) La concavidad de la concha se excava tan profundo como es posible aplicando un injerto de dos tercios o de todo espesor Se aplica entonses el implante cartilaginoso El trago se forma usando el colgajo de piel que originalmente cubiia la concha

Estae primer tiempo es desicivo para los resultados finales

En el segundo tiempo se despega la oreja aplicando injertos de piel en las superficies cruentas adyacentes Se traza un colgajo tubular delgado en el cuello

En el siguiente tiempo, este colgajo se moviliza para formar con el el hélix

---

DISCUSSION

Professor Yrjo Meurman, Helsinki, Finland When correcting the auricles in cases of microtia it is important to know that in most cases the hearing can be improved Generally there is a tympanic cavity although in the place of the tympanic membrane thick and massive bone occludes the innermost part of the meatus The ossicles are also there although the malleus and incus form a common body with only one long process, that of the incus This is in connection with the stapes by a movable joint and the stapes which generally is normally shaped is in its turn mobile in the oval window Consequently, when the osseous tissue occluding the tympanic cavity from the lateral side is removed the chain of the ossicles can function again

In these cases I perform the correction of the auricle and form a meatus in the same stage Most of these patients present a deformed auricle belonging to the category of microtia of the second grade Behind the ear a triangular flap with a caudal pedicle and a pointed cranial tip and a posterior convex side is freed Another incision is made along the anterior border of the rudimentary auricle Then the attachment of the auricle is pierced in its middle in order to allow the flap to be drawn through this slit to the anterior side Before that the antrum, epitympanum and the tympanic cavity are opened by a burr The resulting canal is filled with a tubular split skin graft sutured around a plastic tube The closed end of the skin tube is placed in contact with the auditory ossicles The pedicled flap from behind the ear is now drawn through the slit under the auricular cartilage to the anterior side of the auricle and fixed to the skin either anteriorly or posteriorly of the new meatus The edges of the skin-tube of the meatus are meticulously stitched to the outer skin The auricle is fixed backward to the concave incision border It thus becomes convex backward instead of being convex forward as it was before the correction There thus remains an open although a not perceivable slit under the lower insertion of the auricle This can be secondarily closed if desired

The described correction is sufficient in many cases However, if the auricle looks too small, its border can serve as antihelix and a new helix can be formed with the aid of a tubulated skin flap

The method was illustrated with photographs of several patients treated by form of plastic surgery

Haartmaninkatu 4E,
Helsinki, Finland

A New Autoplastic Procedure for Fixation of Artificial Ears. M OMBREDANNE,* Dr AND PILLET, Dr, *4, rue Logelbach, Paris 17e, France*

The problem of surgical reconstruction of an ear has not yet been solved satisfactorily, in spite of the many autoplastic procedures that have been suggested, such as tubed flaps introduced from a distance through successive migra-

* Chef de Service à l'Hôpital Laénnec, Paris



FIG. 307 Case 4 (Top left) Before operation (Top right) Intermediate stage The axis was not right, further correction planned (Bottom left) Sulcus behind ear too shallow Ear lifted and regrafted. (Bottom center) Lobule brought still more forward by a Z-plasty (Bottom right) Final result 10 days later

the collarline where the skin is hairfree, and the scar is out of sight

At *the third and fourth* (maybe fifth) *stages* the pedicle is inserted at the free border of the new auricle to simulate the helix. Sometimes the distance from the base of the pedicle to the ear is too long, so the pedicle has to be moved in place by the caterpillar method. The pedicle is opened only at the end which is to be fitted in with the lobule Just a segment of the rest is cut off so that it keeps its well rounded shape. That gives the real finishing touch to the new ear At these later stages minor adjustments to the lobule (e.g., bringing it still more forward) or to the tragus, and so forth may be done at the same time

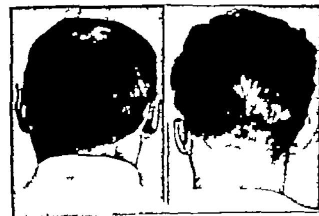


FIG. 308. Two cases postoperatively viewed from behind.

Réconstruction de l'Oreille Absente ou Malformée. Aplasie Congénitale et Microtie. WILHELM LOEHNECKEN

L auteur préfère le cartilage costal autogène en tant que squelette de la nouvelle oreille Le greffon est coupé *in situ* (*voir la figure*) On insiste particulièrement sur la correction du premier dessin, l axe de l'oreille étant inclinée à 30 en arrière.

Dans le premier temps les plis cutanés verticaux (quand ils existent) sont sectionnés obliquement la moitié inférieure (lobule) est tirée bien en avant *et en bas et la moitié supérieure* (segment antérieur de l'helix) est tournée vers le haut (voir figure) Le cavum de la conque est excavé aussi profondément que possible et la peau est greffée (épaisseur 2/3 à 1/1) Le greffon cartilagineux est mis en place On façonne le tragus à l aide du *lambeau cutané qui couvrait au départ* la cavité de la conque Ce premier temps est décisif pour le résultat terminal

Au cours du second temps le pavillon de l oreille est soulevé et on pose les greffes cutanées libres sur les surfaces rugueuses adjacentes. On soulève une fine *greffe tubulée pédiculée en dessous de* la ligne du collier

Dans les temps suivants on met en place le pédicule et on façonne l'helix.

Herstellung des Fehlenden oder Deformierten Ohres, Kongenitale Aplasie und Mikrotie. WILHELM LOEHNECKEN

Der Verfasser bevorzugt autogenen Rippenknorpel als Skelett für das neue Ohr Das Implantat wird in situ ausgeschnitten (siehe Abbildung) Besonderer Nachdruck wird auf eine erste genaue Zeichnung gelegt wobei die Achse des Ohres 30° rückwärts zeigt.

Beim ersten Operationsakt werden die senkrechten Hautfalten (wenn vorhanden) schräg durchtrennt. Die untere Hälfte (Lobulus) wird gut nach vorwärts und abwärts gelagert, die obere Hälfte (Crux anterior des *Helix*) wird nach *oben* rotiert (siehe Abbildung) Das Cavum conchae wird so tief wie möglich ausgehöhlt und mit einem Haut transplantat (von 2/3 bis 1/1 Dicke) versehen. Das Knorpelimplantat wird eingelagert. Der Tragus wird aus dem Hautlappen geformt, der ursprünglich die Ohrmuschelvertiefung bedeckte.

hollow made in the prosthesis and entirely concealed by it

3 An autoplasty for attaching this metallic arc around the ear canal This must insure a solid attachment for the prosthetic ear, but it is essential for the latter to be readily removable, in order to be of practical use

This autoplastic procedure, as devised by ourselves, involves the creation of two cutaneous tubes 3 cm in length formed of whole-thickness skin grafts taken from the thigh and placed in situ by subcutaneous "tunnellization" around the orifice of the ear canal The two tubes, set up along the same curved line, are not continuous but are arranged so that an interval of healthy skin about 1 cm wide is left between them Their raw surface is turned outward, and blends rapidly with the surrounding subcutaneous layers The epithelial surface forms the lumen of the tube Thus are formed two cutaneous tunnels with a thick and resistant wall, entirely enclosed beneath the cranial skin, the openings to which remain pervious, with no risk of secondary stenosis, because the ends of the skin grafts are immediately sutured to the margins of the button-holes through which they pass These tunnels permit ready introduction of and strong attachment for the metallic arc, which, in contact with a completely cutaneous surface, is perfectly tolerated

Operative Technique

First step—Removal from the thigh by means of an electric dermatone a graft of total thickness skin, 0 4 to 0 5 cm in thickness The flap is divided into two rectangles 3 cm in length (Fig 309, right, a)

Second step—Each skin rectangle is rolled on its long axis and transformed into a cylinder by suturing its long sides to each other This closure is made with interrupted sutures of fine silk (Fig 309-b)

Third step—Turning the cylinder like a glove-finger so that its raw surface is outside and its cutaneous surface towards the lumen of the tube The knots are thus automatically placed on the cutaneous side (Fig 309-c)

Fourth step—Setting in place the two cutaneous tubes For the upper tube, two incisions are made 3 cm apart, the first at 12 o'clock, the second at 2 o'clock position in relation to

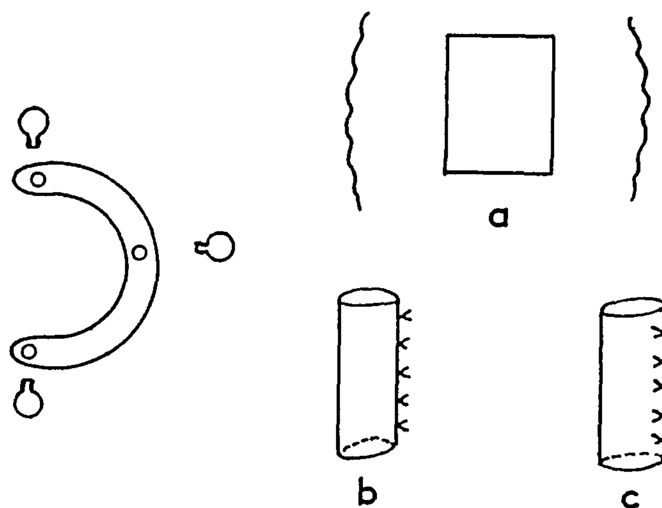


Fig 309 (left) Metal arc with its three removable knobs (Right) (a) Whole thickness skin rectangle taken from the thigh (b) Shaping of a cylinder of the skin graft (c) Turning the graft inside out, so that epithelial surface forms lining

the orifice of the auditory canal (left ear) For the lower tube, two incisions likewise 3 cm apart are made, the first at 4 o'clock, the second at 6 o'clock position

Through these four button-holes it is easy to create by blunt dissection subcutaneous tunnels connecting, on the one hand, the two upper incisions, and, on the other hand, the two lower incisions Each of the two cutaneous cylinders is then passed through the tunnel from one button-hole to the other and its ends are sutured carefully to both lips of each of the incisions through which it has passed (Fig 310, left)

Finally, a curved metallic rod, corresponding exactly to the shape and size of the two tunnels succeeding each other, is placed inside their lumen during the healing period, after a lapse of ten days, the process of cicatrization at the margins of the entrance of each of the two skin cylinders is complete and the superficial sutures

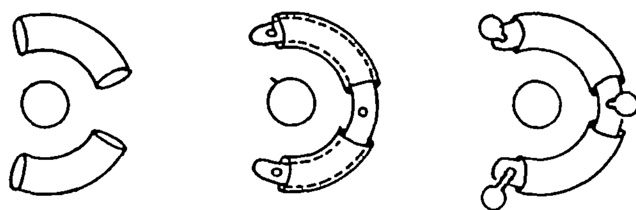


Fig 310 (left) The two cylinders are put in place after tunnelling the skin around the entrance of the auditory canal Their edges are sutured to the lips of the skin incisions through which they are introduced (Center) The metal arc is slipped through the two skin sheaths (Right) The knobs are screwed in the arc, thus fixing it to the skull

tions, uni or bi pedicled cervical or cranial flaps, cartilage moulded beneath remote integuments, transplanted in situ and covered with skin The final appearance of the ear following such procedures is very far from perfection and does not compensate for the required number of successive operations and for the multiplicity of resulting scars. The majority of plastic surgeons agree that in the event of total loss of the pinna subsequent to wound or burn when there remains only the gaping orifice of the auditory canal flush with the cranium, it is not possible for any autoplastic procedure to approach *morphologically a well devised and fitted* prosthetic ear

On the other hand, as regards an aplasia of the pinna, either in adults or in children our experience based on 227 cases *leads* us to consider the problem according to whether there remain, or not some elements of the pinna Three contingencies should be considered

(a) The rudimentary pinna is but a simple microtia The best decision here is to take advantage of it as it is—either without displacing it and creating in its centre an auditory canal where this canal is imperforate—or by moving it from its abnormally forward position backward and by modeling it to bring it to its normal site in front of the mastoid before constructing the new canal which is an essential step in the cosmetic and functional restoration in the aplasia of the ear as we could show in a number of personal cases.

(b) The pinna consists of a vertical skin pad which is always too short, too far anterior and low placed as compared with the proper site of the pinna in front of the mastoid This is the most common finding Here one should utilize this skin pad in order to work out by means of successive autoplasties a pinna as nearly nor*mal as possible in shape and size strengthening* it with either cartilage or acrylic or polyethylene.

There is no doubt that particularly in a child the wearing of a prosthetic ear is a source of continual difficulty *especially at school age* and that the child, even when very young would be far more satisfied to have his own real and stable ear even though this did not show the refinement and ideal appearance of a normal ear

(c) There is no embryonal vestige that might be utilized. Here we come back to the same conditions of a total loss of the pinna as caused by trauma or burn.

A prosthetic device here seems preferable to a total otoplasty One of us had previously obtained very successful prosthetic results in fingers and hands (Iselin and Pillet) affording a perfect illusion of the absent member both to sight and touch thanks to the employment of a supple and light plastic material which can be readily *fitted by mere adhesion on the stump* of the limb

In the same way artificial areas were produced, giving the perfect illusion of a supple and *fine skin* one in a burn case (*Morel Fatio* and Pillet), the other in an aplasia case (Aubry and Pillet) But the problem of fixation of prosthetic ears is far more difficult to solve than that of maintenance of a finger or a hand and so far all procedures that were attempted seem to have finally resulted in failure.

Attempts were made to attach the artificial ear either by means of plastic slips inserted into skin slits or by tying it to small bipedicled bridge flaps. We also had hoped to succeed in setting up around the auditory canal several separated bearing points fixed on the skin by metallic rings similar to earrings.

But with all these devices eventually the depressions fill up the flaps shrink and break, the rings cut the skin pads and the prosthetic ear loses its attachment.

We think we have solved the problem by using another method, which we now present

Three elements are involved in our procedure

1 An artificial ear made of supple plastic *substance bearing on its inner surface* (cranial side) three very small hollows intended for its attachment.

2. A rigid metallic arc, C-shaped (Fig 309 *left) to circumscribe at a short distance* the orifice of the auditory canal This is provided with three small removable metallic knobs, each of which can be screwed into the arc by a *threaded hole in the latter One knob is fixed* at the upper end of the arc a second at its lower end, the third in the middle This metallic arc with its three small knobs constitutes the cranial counterpart of the artificial ear *Each* of the three spherical knobs is to be snapped by slight pressure in the corresponding small

Nuevo Procedimiento Autoplastico para Fijar Orejas Artificiales. M OMBREDANNE Y PILLET.

En caso de pérdida total de pabellón (accidental o por quemadura), o ausencia congénita de toda la oreja sin ningún resto embrionario que pueda utilizarse para restablecerlo, hay un recurso para sostener y suplir una oreja protésica por un nuevo procedimiento autoplástico. Se hacen dos tubos de piel y se deslizan alrededor de los tegumentos del mastoides, debajo de la escotadura del conducto auditivo externo y se suturan Se inserta un arco metálico dentro de los tubos, se inmobiliza por medio de tres tornillos de esfera que fijan la oreja protésica Los orificios quedan bien fijos, y además la oreja y sus soportes pueden quitarse y ponerse a voluntad

---

Original Technique for the Correction of Some Shell Ears.

CÉSAR LABORDE, Dr, *Cuernavaca 155, Mexico 11, D F, Mexico*

The so-called "shell ear" is a congenital defect of the auricle, with the following features a marked fold of varying degree located at the upper part of the helix, causing a parallel reduction in height and width of the organ, with concomitant diminution of the inner perimeter and lessening or total absence of the ridge formed by the crus of the helix at the center of the concha Secondarily, the bifurcation of the anti-helix does not exist, owing to lack of its upper branch, consequently, neither does the fossa of the anti-helix (Fig 312)

This disfigurement is not uncommon and it probably ranks in third place of auricular anomalies, first and second places being held respectively by protruding ears and missing ears It has sometimes been considered as a type of microtia because of the noticeable shortening of the appendix

Heretofore, the surgical correction of this deformity has been rather disappointing, despite the fact that it entails the performance of several operative steps, and these reasons plainly justify every effort spent in the solution of the problem

In the last few years the author has devised a procedure which has rendered gratifying results and its description is as follows

Anatomical bases of the recommended technique The folded portion of the auricle always contains cartilage There is generally a small artery (Fig 312), branch of the superficial temporal, entering that part of the ear and running parallel to its inferior border Moreover, the upper auricular branch of the post-auricular artery (both are branches of the external carotid, as is well known) emerges from the vessel almost at the middle part of the pavilion on the retro-auricular groove

The nerve supply (Fig 312) is almost parallel to that of the arteries on both aspects of the auricle There is, as a rule, an area of hairless skin above the upper part of the ear

Pre-operative study In most cases it is possible to visualize the arteries of the auricle by examination with special precautions (trans-illumination), and this maneuver would contribute toward giving the surgeon accuracy and confidence when planning the future incisions

For selecting the cases amenable to this method of correction it is quite useful to make a replica of pure latex of the ear to be operated on This artifice also permits one to experiment with the best incisions and adjustments to be done on the defective ear in order to achieve a good result Furthermore, should the attempt to improve the appearance on the working model fail, the cuts on it could quickly and safely be rectified by smearing the surfaces with plain rubber cement and pressing the parts together for a few minutes, and then a new trial could be done without any further trouble

Pre-operative care Prior to the operation the auricle and the surrounding area have to be thoroughly washed and dried before disinfection, chiefly on the outer part of the appendix because of its uneven surface The hairs of the adjacent part should be carefully clipped (avoid shaving them) to be used as land-marks during the operative act

Anesthesia In older children and in adults the whole procedure could be executed under conduction and local anesthesia, according to any good standard method as Pitkin's ("Conduction Anesthesia," Lippincott 1953, page 355), whereas in pusillanimous patients or in younger children general anesthesia by endo-tracheal route has to be employed

Surgical technique

1 Mark with Bonney's blue the incisions to be made (Fig 312)

that had been placed at each end of the tunnels are removed There remains only to replace the provisional rod by the metallic arc which is the mobile armature of our prosthetic device (Fig 310 center) Its introduction is readily performed as it slides upon a smooth and continuous skin surface Once the arc is in place its upper end protrudes from the entrance of the upper tunnel and its lower end from the entrance of the lower tunnel, two of the three fixation knobs are therefore screwed into the threaded holes located near the two ends of the arc The third knob is screwed at the middle of the curve between the two tunnels over the free cutaneous area that separates them. Now the artificial ear may be attached by slight pressure of its base upon the three knobs which penetrate the small cavities intended for them.

In this way the artificial ear is perfectly fixed by three points superior inferior and posterior thus insuring excellent maintenance with no risk of rotation or detachment. The prosthetic ear may be removed and reattached at will it may be changed, if needed in the course of growth if the subject is a child The metallic arc that maintains it is also readily removable its cleansing is therefore easily carried out. Its size is such that, being inserted into two tubes made of whole skin with thick and resistant walls there is no danger of the skin being cut under the very small weight of the prosthetic ear

We have employed this procedure many times. It appears to meet the very special conditions required for the maintenance of artificial ears Figures 311 left, center and right, illustrate a patient in whom this procedure was carried out.

SUMMARY

In case of total loss of the pinna (accident or burn) or total congenital absence with no embryonal remnants available for its reconstruction (rare case) it is possible to have recourse to a supple and light prosthetic ear and to fix it to the skull by a new autoplastic procedure two pre-fabricated cutaneous tubes (whole skin) are made beneath the mastoid integument around the gaping external auditory canal A metallic arc is inserted into these tubes. The artificial ear is immobilized by means of three small screwed-in knobs, on which the artificial ear is closely fitted. The whole of the device insures in this way a very strong attachment, but the artificial ear and its support remain removable at will



FIG. 311 (left) Total aplasia of the left external ear in a six year-old child (Center) The auditory canal is shaped and the autoplasty to fix the prosthetic ear is completed. (Right) The prosthetic ear is set in place.

Un Nouveau Procede Autoplastique pour la Fixation des Oreilles Artificielles. M OMBRÉDANNE ET PILLET

Dans le cas de perte de la totalité du pavillon (accident ou brûlure) ou de l absence congénitale de la totalité du pavillon sans reliquat embryonnaire utilisable pour une restauration il est possible d avoir recours à une oreille esthétique souple et légère et à la fixer sur le crâne à l'aide d un nouveau procédé autoplastique on fait glisser deux tubes cutanés (pleine peau) préfabriqué sous la *mastoïde autour du canal auditif externe* et on les suture On insère un arc métallique dans ces tubes, on l'immobilise par trois petites sphères filetées, et on fixe sur le cou la prothèse de l oreille. *Tout cela permet une fixation très ferme* bien que l oreille et son support soient amovibles à volonté.

Ein Neues Autoplastisches Verfahren zur Fixation Künstlicher Ohren. M OMBRÉDANNE UND PILLET

Im Falle des Verlustes des gesamten äusseren Ohres (Unfall oder Verbrennungen) oder bei angeborenem Fehlen des äusseren Ohres, ohne irgendwelche für eine Wiederherstellung verwendbaren embryonalen Reste kann man zu einer geschmeidigen und leichten Ohrprothese seine Zuflucht nehmen und diese mittels einer neuen autoplastischen Methode am Schädel befestigen

Zwei vorgeformte Hautschläuche (Vollhaut) werden unter die Hautbedeckung des Mastoids um den klaffenden äusseren Gehörgang herum geschoben und eingenäht. Ein Metallbogen wird in diesen Schlauch eingeführt. Er wird durch drei kleine kugelförmige Schrauben, an denen das prothetische Ohr befestigt wird immobilisiert Die ganze Apparatur bewirkt eine sehr feste Fixation, obwohl das Ohr und sein Stützapparat beliebig abnehmbar bleiben

exposed sutures removed, excepting the ones anchoring the skin of the flaps to the scalp Five days later the remaining stitches should be removed, but it is safer to continue keeping the auricle against the cranium by means of an elastic bandage for a few additional days

Addendum Inasmuch as there generally remains a slight convexity at the lower margin of the new helix, corresponding to the small skin-cartilage flap (namely, the anterior one)—for it would be unwise to excise it at the time of the operation, because of possibility of interfering with the blood supply—it is advisable to perform a minor complementary retouching some months afterwards At this time, a narrow strip of skin and cartilage can be safely removed to obtain a continuous and more pleasant curve on the rim of the helix Furthermore, it would be feasible to utilize that portion of cartilage in the formation of the crus of the helix, which is generally absent, as was mentioned, by introducing it into a subcutaneous tunnel through a small opening conveniently placed

Figure 313 shows pre- and post-operative pictures of one case

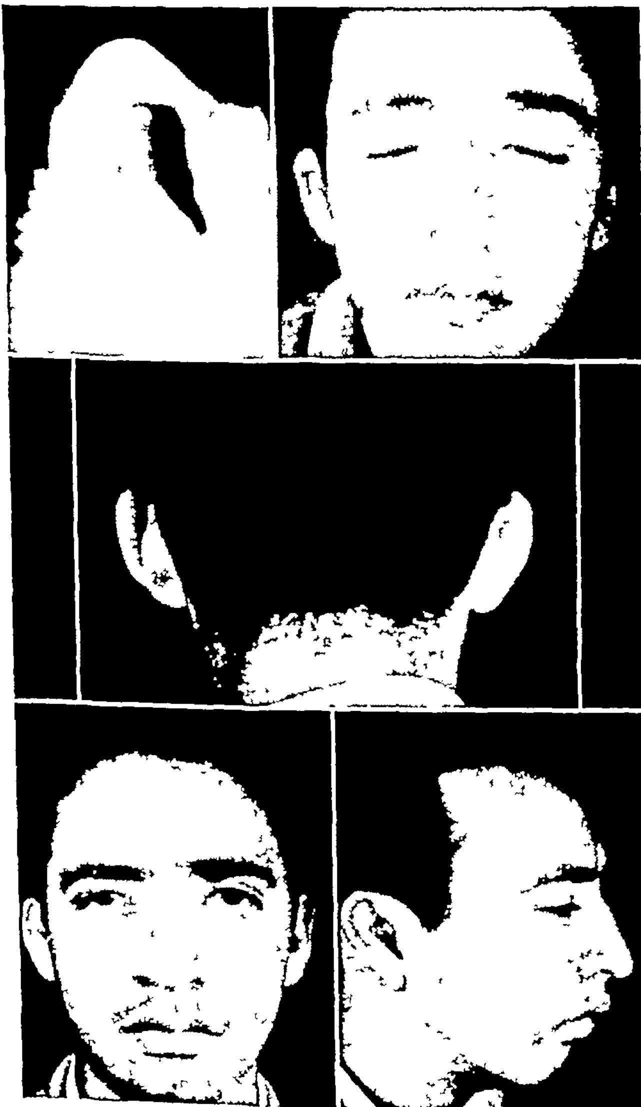


Fig 313

Technique Originale pour la Correction de Quelques Oreilles en Coquille. César Laborde

L'auteur commence par une description précise de cette malformation et signale sa fréquence relative et les résultats plutôt décevants obtenus à ce jour par les méthodes habituelles Dans son étude préopératoire l'auteur attire l'attention sur de nombreux faits anatomiques importants qui constituent la base de sa technique et en dehors de la technique chirurgicale elle-même il insiste sur la très grande utilité de la confection d'une reproduction en latex de l'oreille malformée Cette réplique servira de modèle de travail et permettra d'y voir quelles sont les meilleures incisions et corrections à apporter

La nature du matériau utilisé permettra la "soudure" des parties sectionnées à l'aide de ciment caoutchouté dans le cas où le résultat obtenu n'aurait pas été satisfaisant et rendra possible de faire ensuite un autre essai

On décrit ensuite temps par temps la technique chirurgicale complète

Afin d'illustrer les bases de l'opération et pour compléter les explications théoriques quelques dessins complètent l'article ainsi que des photographies d'un malade présentant un cas de malformation typique (oreille en coquille) avant et après l'opération

Eine Originaltechnik fur die Korrektur einiger Muschelohren. César Laborde

Zu Beginn gibt der Verfasser eine ausfuhrliche Beschreibung des Defektes, erwahnt seine relative Haufigkeit und die ziemlich enttauschenden Ergebnisse, die bisher mit den gewohnlichen Methoden erzielt wurden

In der praoperativen Betrachtung weist der Verfasser auf verschiedene wichtige Tatsachen als Basis fur seine Technik hin und empfiehlt als den bedeutendsten Beitrag, ausser der chirurgischen Technik selber, die Zweckmassigkeit der Anfertigung eines Musters des Defektohres aus Latex Dieses Muster soll als ein Arbeitsmodell und zum Ausprobieren der besten Schnittfuhrung und Korrektur (adjustment) dienen Die Natur des Materials gestattet das "Schweissen" der abgetrennten Teile, indem man in Fallen eines unbefriedigenden Ergebnisses Gummiklebstoff gebraucht, um dann weitere Versuche zu machen Spater wird die vollstandige chirurgische Methode Schritt fur Schritt beschrieben Um die Grundlagen der Operation zu illustrieren und die theoretische Erklarung zu vervollstandigen, werden einige Zeich-

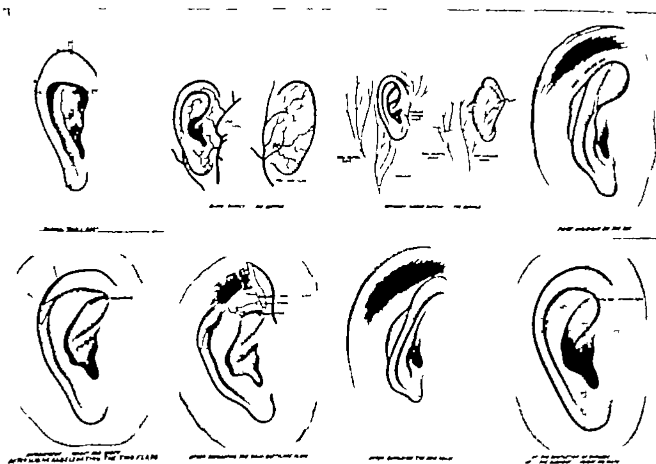


Fig 312

2 Transfix the upper end, the folded portion by means of a #11 knife

3 Incise over the retro-auricular furrow until entering the concha, but without reaching the mid point, whenever possible thus preventing the severing of the upper auricular artery

4 Slide and elevate the two resultant flaps to lengthen and to widen the ear (Fig 312)

5 Calculate the exact place where to anchor the cartilage at the scalp

6 Trace a bi-pedicled skin flap on the hairless portion of the scalp for covering the horizontal raw surface left by the separation of the two skin–cartilage flaps (Fig 312)

7 Undermine the bi pedicled flap to bring it down into the defect

8 Superficially incise both ends of the same flap to permit their adjustment to the borders of the skin-cartilage.

9 Denude some portions of the scalp (skin only making sure of excising the hair folicles) to create a new bed for the above flaps.

10 Excise a small portion of the rear border of the greater flap to facilitate its accommodation onto the scalp

11 Anchor there the cartilaginous framework of both flaps by buried white silk sutures two of them at least followed immediately by superficial skin sutures of fine black silk or fine stainless steel wire all around the new upper margin of the auricle and on the slanting borders of the sliding flaps (Fig 312)

12 Painstakingly suture the small bi-pedicled cutaneous flap at the upper part of the concha with very fine suture material

13 Trim the open rim of the outer skin-cartilage flap by slight undermining of the skin margins, mainly of the upper one (Fig 312)

14. Carefully pack all the concavities of the ear and likewise the retro-auricular furrow with small moistened cotton pledgets.

15 And finally place a dressing pad all over the auricle and the surrounding area hold "in situ" with an elastic bandage moderately tightened.

Post-operative care The ear should be examined on the fifth post-operative day and the



Fig 316

ear, are placed under the inserted sutures (Fig 315, 5)

Stage V—Sutures are tied over a roll of gauze placed behind the ear Excessive pressure should not be exerted upon the sutures, but just enough to permit an elastic pressure (Fig 315, 6)

Stage VI—The same procedure should be performed for the antihelix, and the wound is covered with tulle-gras (Fig 315, 7 and 8)

Following the three consecutive post-operative days, penicillin injections should be given, and between the 10th-14th day sutures should be removed

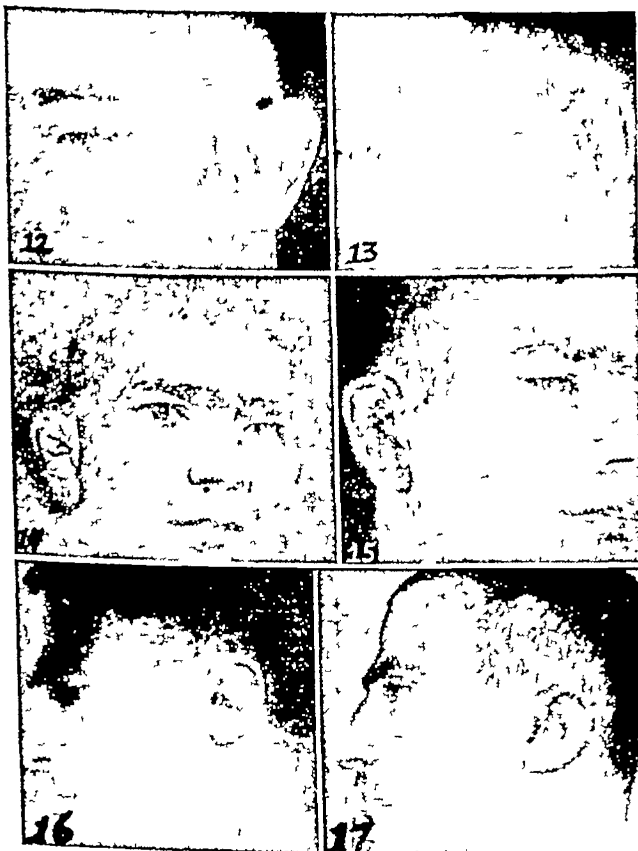


Fig 317

In longer standing cases where fibrosis has taken place the organized hematoma is exposed by a helix incision, and extirpated by fine gouging, after suitable "sculpture work" the skin is replaced and the ear fixed within moulds as before

Four series of photographs are presented to illustrate 4 cases selected from those having been operated on by this method (Figs 316, 317)

Une Nouvelle Méthode de Traitement Chirurgical de l'Oreille en Chou Fleur. Halit Ziya Konuralp

Dans le but de donner à l'oreille des lutteurs la forme désirable après avoir évacué l'hématome par une petite incision adjacente à l'anthelix, les récessus de l'helix et de l'anthelix sont remplis de gutapercha de dentiste qui est fermement fixé sur l'oreille à l'aide de fils d'acier inoxydable ou de fils noirs fins en nylon On enlève moule et suture 11 à 14 jours après l'intervention

Dans les cas plus anciens dans lesquels il y a déjà eu de la fibrose, l'hématome est mis à nu par une incision sur l'helix et extirpé avec une curette fine Après "sculpture" convenable la peau est remise en place et l'oreille immobilisée dans des moules comme précédemment

Eine Neue Methode der Chirurgischen Behandlung von Blumenkohlohren. Halit Ziya Konuralp

Um Ringkampferohren die gewunschte Form zu geben, nachdem durch eine kleine Incision neben dem Anthelix das Haematom entleert wurde, werden die Ausbuchtungen des Helix und Anthelix mit zahnarztlicher Guttapercha ausgefullt, das mittels rostfreien Stahls oder dunner schwarzer Nylonnahte fest an den Ohrmuscheln fixiert wird Die Nahte und die Fullmasse werden elf bis vierzehn Tage nach der Operation entfernt

In langer zuruckliegenden Fallen, wo schon

nungen und Bilder eines Patienten mit typischem Muschelohr vor und nach der Operation gebracht.

Tecnica Original para la Correccion de Algunas Orejas en Asa. CÉSAR LABORDE.

El autor hace una descripción del defecto men cionando su frecuencia relativa y los resultados pobres obtenidos con los métodos comunes.

En el estudio pre-operatorio el autor señala algunos importantes hechos anatómicos las bases de su técnica y las contribuciones más notables al mismo tiempo que su técnica quirurgica. Recomiendo la conveniencia de hacer en latex la reproducción de la oreja defectuosa para que ésta réplica sirva como modelo de trabajo para encontrar las mejores incisiones y ajustes

La naturaleza de éste material permite "soldar" las diferentes partes usándo cemento de hulo en caso de un resultado no satisfactorio y así buscar otra solución.

A continuación describe paso por paso la técnica quirúrgica completa.

Para ilustrar los fundamentos de la operación y completar las explicaciones teóricas incluye algunos dibujos y fotografías de un paciente con el defecto típico antes y después de la operación.

A New Method of Surgical Treatment for Cauliflower Ear

HALIT ZIYA KONURALP M D Professor F I. C S F R S M Eng., *Elhamra apt 1, Beyoglu, Istanbul Turkey*

It is proposed to introduce a new method for the surgical treatment of otohematoma or cauliflower ear This condition is frequently seen in countries where wrestling and boxing are popular Concerning its operative cure, several attempts have been made up to this date. The operative principles for these procedures are almost all alike and reports concerning the cures produced are not very encouraging. However we have introduced a new method, by modifying the operative procedure and dentist s Gutta Percha moulds are being used for the first time for filling the recesses of the ears.

The operation consists of the following stages

Stage I—In early cases, where fibrosis has not yet taken place, the hematoma is evacuated by a small incision adjacent to the anthelix (Fig 314 1 and 2)

Stage II—Dental Gutta Percha is immersed in hot water so as to form a pliable mass, whereupon two moulds are prepared for the helix and antihelix successively as shown in Fig 314 3



FIG. 314

Stage III—Tracing the curve of the helix, double O nylon or stainless steel sutures are passed separately through the entire thickness of the ear (Fig 314 4)

Stage IV—The prepared moulds to fit the helix curve on the anterior surface of the

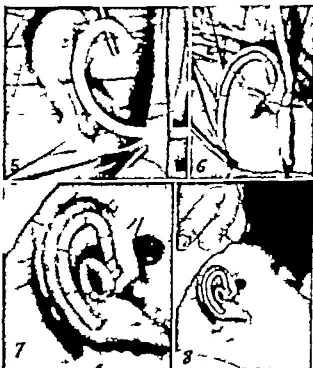


FIG 315

VII

SCALP AND CRANIUM

The Treatment of Scalp Deformities.

FREDERICK A FIGI, M D, *Section of Plastic Surgery and Laryngology, Mayo Clinic and Mayo Foundation,* AND A MORGAN STRUTHERS, M D, *Fellow in Plastic Surgery, Mayo Foundation, Rochester, Minnesota*

Since publication of the first detailed article on scalping accidents by Davis in 1911,[1] there have been many contributions to the medical literature discussing the various causes, types and treatment of scalp deformities These articles have been written for all time and they need not be summarized Of greater significance is the fact that this combined literature points out the evolution in our thinking on the problem of scalp deformities so that today, through the documented experience of many surgeons, the fundamental problems inherent in the treatment of this condition appear quite clear The purpose of this paper, therefore, is not simply to review but rather to emphasize a rational therapeutic approach to these fundamental problems as we know them today and as they arise in the various types of scalp deformity

The treatment of a scalp deformity is largely the treatment of a scalp loss In considering such losses the surgeon should appreciate not only the size of the defect but its depth as well The size of a scalp defect may vary from a diameter of 1 cm, as would follow removal of a small mole, to that of total avulsion of the scalp Likewise, the depth of the loss is variable and may extend through any of the various layers of the scalp

Anatomically, the scalp is arranged in five layers which include (1) the skin with its appended hair, (2) the subcutaneous tissue, (3) the aponeurotic layer or galea, (4) a loose subaponeurotic layer and (5) the outer periosteum of the cranial bones Together these five layers form a freely moving, nice-appearing protective covering of the cranial bones Whether one or several of these layers of scalp be accidentally avulsed, injured by burn or surgically excised with tumorous growth, two important problems must always be considered First, there is the hair, which is primarily of cosmetic concern Normally, hair is distributed uniformly over the scalp and joins with hairless skin of the forehead, temple and posterior cervical region in a rather distinctive and pleasant pattern In men and women alike, elimination or concealing of bald spots and restoration of normal hairlines are important considerations in the treatment of any deformity of the scalp The second problem is that of the cranial bones, where early provision for protective covering is of vital significance Exposed cranial bone soon becomes infected and necrotic when periosteum has been removed Occasionally, complete eradication of tumorous growths of the scalp dictates removal of part or all of the underlying cranial bone and at times even the dura itself In either instance, prompt protective covering of cranium, dura and brain cannot be avoided

With the recognition of these fundamental problems, scalp deformities may be very simply classified into three categories as (1) partial scalp losses not extending through the periosteal layer, (2) partial scalp losses extending, in part, at least to or through cranial bone and (3) total scalp losses For the immediate and late correction of these three types of scalp loss, the following four surgical procedures have proved to be of particular value over the years (1) direct approximation of wound edges primarily or following serial excisions of a defect, (2) free

Fibrose eingetreten ist wird das Haematom durch eine Helixincision freigelegt und durch behutsames Auslöffeln entfernt. Nach geeigneter "Bildhauerarbeit" wird die Haut zurückverlegt und das Ohr wie oben beschrieben in der Form fixiert

Un Nuevo Metodo de Tratamiento Quirurgico de Orejas de Coliflor HALIT ZITA KONUKALP

Para dar la forma deseada a las orejas de luchador después de la evacuación del hematoma por una pequeña incisión cerca del antihelix el hélix y el antihélix se fijan con gutapercha de dentista atada firmemente a la oreja con puntos alambre de acero inoxidable o nylon. Los puntos y los moldes se retiran de once a catorce días después de la operación

En casos antiguos cuando ya hay fibrosis, el hematoma se retira por una incisión en el hélix raspando con una cucharilla fina después de esto la piel se coloca en su lugar y la oreja se fija con los moldes de gutapercha.

VII

SCALP AND CRANIUM

The Treatment of Scalp Deformities.

FREDERICK A FIGI, M D, *Section of Plastic Surgery and Laryngology, Mayo Clinic and Mayo Foundation,* AND A MORGAN STRUTHERS, M D, *Fellow in Plastic Surgery, Mayo Foundation, Rochester, Minnesota*

Since publication of the first detailed article on scalping accidents by Davis in 1911,[1] there have been many contributions to the medical literature discussing the various causes, types and treatment of scalp deformities These articles have been written for all time and they need not be summarized Of greater significance is the fact that this combined literature points out the evolution in our thinking on the problem of scalp deformities so that today, through the documented experience of many surgeons, the fundamental problems inherent in the treatment of this condition appear quite clear The purpose of this paper, therefore, is not simply to review but rather to emphasize a rational therapeutic approach to these fundamental problems as we know them today and as they arise in the various types of scalp deformity

The treatment of a scalp deformity is largely the treatment of a scalp loss In considering such losses the surgeon should appreciate not only the size of the defect but its depth as well The size of a scalp defect may vary from a diameter of 1 cm, as would follow removal of a small mole, to that of total avulsion of the scalp Likewise, the depth of the loss is variable and may extend through any of the various layers of the scalp

Anatomically, the scalp is arranged in five layers which include (1) the skin with its appended hair, (2) the subcutaneous tissue, (3) the aponeurotic layer or galea, (4) a loose subaponeurotic layer and (5) the outer periosteum of the cranial bones Together these five layers form a freely moving, nice-appearing protective covering of the cranial bones Whether one or several of these layers of scalp be accidentally avulsed, injured by burn or surgically excised with tumorous growth, two important problems must always be considered First, there is the hair, which is primarily of cosmetic concern Normally, hair is distributed uniformly over the scalp and joins with hairless skin of the forehead, temple and posterior cervical region in a rather distinctive and pleasant pattern In men and women alike, elimination or concealing of bald spots and restoration of normal hairlines are important considerations in the treatment of any deformity of the scalp The second problem is that of the cranial bones, where early provision for protective covering is of vital significance Exposed cranial bone soon becomes infected and necrotic when periosteum has been removed Occasionally, complete eradication of tumorous growths of the scalp dictates removal of part or all of the underlying cranial bone and at times even the dura itself In either instance, prompt protective covering of cranium, dura and brain cannot be avoided

With the recognition of these fundamental problems, scalp deformities may be very simply classified into three categories as (1) partial scalp losses not extending through the periosteal layer, (2) partial scalp losses extending, in part, at least to or through cranial bone and (3) total scalp losses For the immediate and late correction of these three types of scalp loss, the following four surgical procedures have proved to be of particular value over the years (1) direct approximation of wound edges primarily or following serial excisions of a defect, (2) free

skin grafting (3) rotation or advancement of adjacent hairbearing scalp flaps and (4) transfer of pedicled flaps from remote areas to the scalp In losses of appreciable extent a combination of the first three or even of all four of these procedures often is required.

Before the application of these four surgical procedures to the various types of scalp deformity is discussed a few important preoperative considerations might be mentioned First, ample hair should be shaved away to provide a clean and adequate surgical field. In removing hair one should carefully identify normal hairlines for later reference. Second anesthesia must be adequate General anesthesia is preferable in all but the very smallest repairs of the scalp If in emergent situations there is neurologic or other contraindication to general anesthesia a wide nerve block of the scalp with a local anesthetic agent may be employed for repairs not lasting more than 1 hour Third, positioning of the patient should allow satisfactory access to the entire frontal temporal and occipital parts of the scalp as well as to hairy regions of the neck. Fourth, a donor site for free skin grafts should be prepared in all but the most minor scalp losses. Fifth surgical draping should afford sterile exposure of the entire scalp as well as all hairlines in frontal temporal and cervical regions that may be affected by the surgical procedure Attention on the part of the surgeon and his assistants to these elementary preoperative details lends to the surgical procedure a simplicity that is ultimately reflected in a more satisfactory surgical repair of the following deformities of the scalp

I Partial Scalp Losses Not Extending Through the Periosteal Layer

The simplest type of scalp deformity or loss is commonly encountered following surgical removal of tumorous growths such as small hemangiomas, wens, moles or small superficial epitheliomas or following accidental abrasions or burns of the scalp Not infrequently the small defect is an area of postinfectious or postirradiation alopecia. These losses would not represent more than a few centimeters in diameter and would not extend in depth beyond the subaponeurotic layer Here there *is no problem* of coverage of cranial bone, and the small size of the loss allows for simple, wide undercutting of wound margins with direct approximation of scalp edges. Such a closure eliminates bald areas at once (Fig 318) If however even these smallest of defects fall along hairlines restoration of this hairline must be accurate This may at times necessitate rotation of an adjacent hair-bearing flap with direct approximation of the resulting scalp wound The scalp is a very vascular tissue with considerable arterial blood supply from several sources This allows one to develop and rotate several flaps for the closure of a single defect (Fig. 319) If such small defects involve but the outer layer or two of scalp it is usually advisable to extend the wound as deep as the aponeurotic layer If this is done subsequent undercutting and direct approximation of wound edges is accomplished without significant tension, thereby minimizing the chance of a bald relaxed scar

Whenever possible, wounds of this category that can be closed by direct approximation of scalp edges or *rotation of small hair-bearing* flaps should be closed immediately This eliminates long periods of healing and secondary operations in the case of small burns abrasions or wounds created by removal of tumors. However certain tumors of the scalp of which basal cell epithelioma is a more common example are not always completely removed with certainty If immediate histologic examination of excised tissue by the frozen-section technic is not possible or *if there is any doubt that the growth may* not have been completely removed, it is advisable to cover the resulting scalp wound with a split thickness free graft. Not infrequently recurrent tumors have to be removed during the course of the subsequent 3-month or 6-month observation period. When the area has remained free of tumor growth for a period of 12 to 18



Fig 318. *a* Localized sclerosing angioma with atrophy and loss of hair follicles. *b* Result following simple excision and primary closure of wound after wide undercutting of margins.

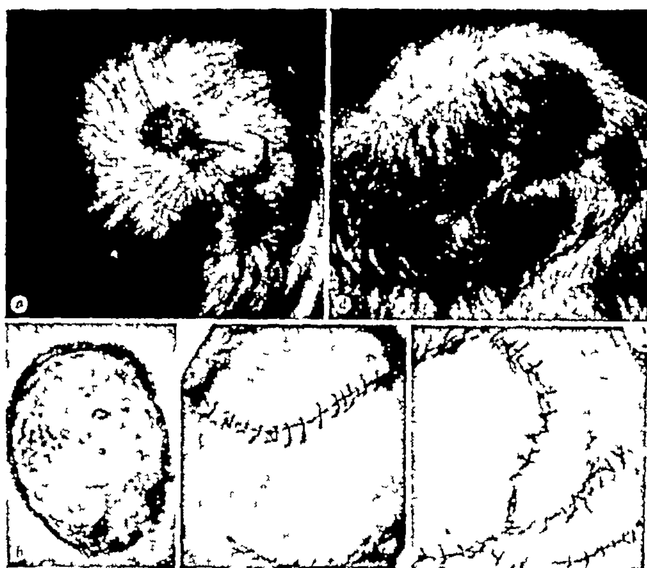


FIG 319 *a* Deeply pigmented, grossly malignant lesion on vertex of scalp of some years' duration with recent progression *b* Operative defect Clinically, the lesion had appeared to be a melano-epithelioma but microscopically it proved to be a basal cell epithelioma *c* Immediate repair of wound using multiple scalp flaps *d* Result 3 months after operation



FIG 320 *a* Extensive postradiated basal cell epithelioma of forehead and scalp treated by excision and full-thickness skin graft *b* Subsequent recurrent lesions 3½ years and 16 years later were excised and the wounds repaired with skin grafts and scalp flaps *c* and *d* Restoration of hairline by transfer of scalp flaps

months, the skin graft may be excised and the distribution of hair properly arranged by rotation of hair-bearing flaps of scalp (Fig 320) The free motion afforded by the subapneurotic layer allows for a degree of advancement of the scalp Therefore, by partial serial excisions of a benign lesion, a scarred defect or a previously applied skin graft, bald areas can be avoided (Fig 321) Even large areas of depilation, irrespective of their cause, may be resurfaced with hair-bearing skin very satisfactorily (Fig 322)

When large portions of scalp are lost as the result of either trauma or surgical removal of a tumor without disturbance of the periosteum, the initial wound will most often be covered with a free-split-thickness skin graft This is indicated at the time of removal of extensive benign tumors where inadequate scalp remains for complete coverage and hairlines are not too greatly disturbed (Fig 323) In burns of large areas of the body or when the patient's condition is critical, one may elect to but clean and dress the wound and allow granulation to take place before applying skin grafts or repairing the deformity in some other fashion The primary use of skin grafts in these larger defects allows improvement in the patient's condition, observation of a defect for recurrence of tumor, and delineation of useful hair-bearing scalp, and provides time for study of the most advantageous use of remaining hair-bearing scalp for concealing of bald spots and restoration of hairlines In the secondary repair of these larger defects, rotation of hair-bearing flaps of scalp or transfer of pedicled scalp tissue will prove most useful Only rarely will it be necessary to utilize pedicled skin from other parts of the body

II Partial Scalp Losses Extending to or Through the Cranial Bones

Such injuries present the problem of both the distribution of hair and the coverage of bone The distribution of hair is managed in the same fashion as for deformities of the previous category but becomes of secondary consideration if there is loss of bone The coverage of bone

is of particular and immediate concern hence emphasis must be placed upon the care of these defects within the first few hours after injury

In accidental injuries that expose or injure cranial bone, careful immediate attention should be given to all bodily structures in general and to intracranial structures in particular Occasionally the patient's condition will not justify more than immediate cleansing and débridement of the scalp wound and protection by a sterile dressing. However, as soon as the patient's condition warrants an orderly surgical procedure preferably under general anesthesia should be carried out for the exposed cranial bone.

If the defect in the scalp extends only through periosteum, the exposed bone should be thoroughly cleansed. The bone is then best covered by rotation of a hair-bearing flap of scalp The hairline may be repaired at the same time If sufficient healthy scalp tissue is not available for complete coverage of bone free skin grafting will have to be employed In so far as free skin grafts of any thickness will not survive on cortical bone it becomes necessary to expose underlying bone marrow if such grafts are to be used. For exposing the marrow two methods have proved successful over the years. One method is to burr scattered holes through the outer cortical plate and into the marrow waiting approximately 2 weeks for a bed of granulation tissue to form upon which a free graft will take successfully The other method is to rongeur away the entire outer cortical plate to accom-



FIG. 321 *a* Recurring neurofibrosarcoma of anterior scalp and forehead. *b* Result following excision and repair with scalp flap and skin graft to donor area *c* Subsequent excision of skin graft and repair with scalp flaps. *d* Final result.



FIG. 322 *a* Radiodermatitis with depilation following treatment of ringworm with roentgen rays *b* and *c* Repair with scalp flap from occipital region and free skin graft to donor area.

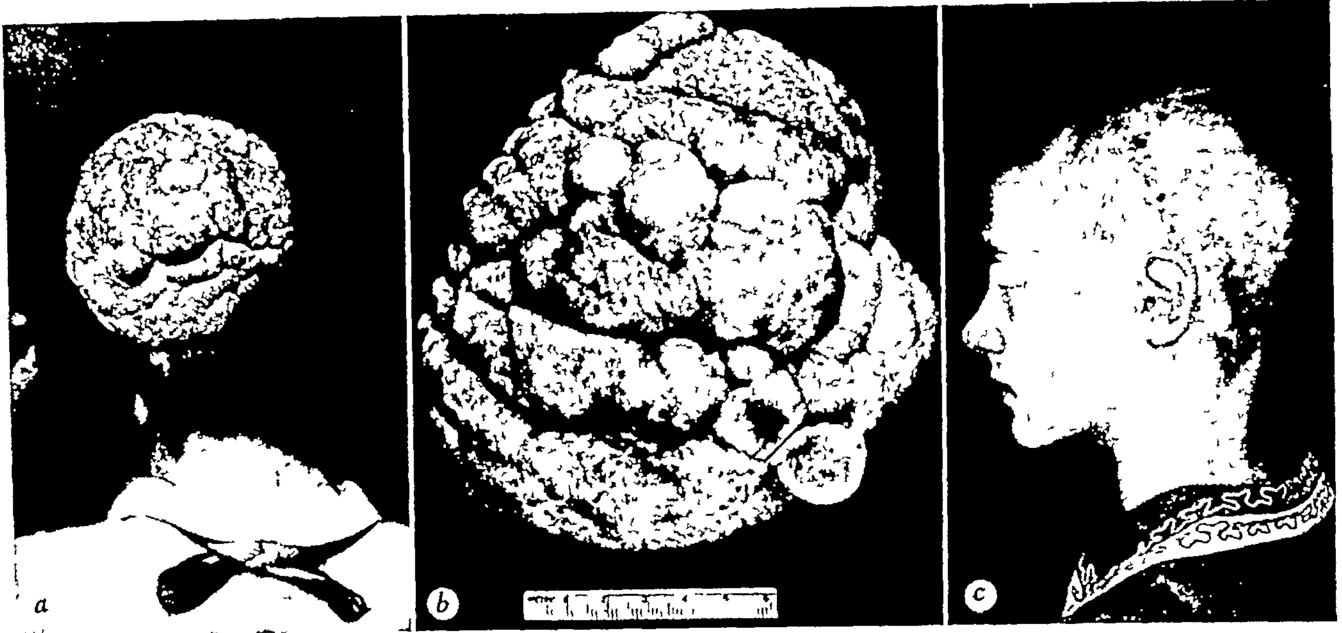


FIG 323 *a* Large fibrous mole of the scalp treated by excision in a single stage and skin graft to the exposed periosteum *b* Excised specimen *c* Repair with split-thickness skin graft

plish the same purpose However, more recently it has been shown that free skin grafts placed directly upon the exposed bone marrow will survive as well as if they are placed upon granulation tissue Either method may be used for the immediate covering of bone with free skin grafts when rotation of scalp flaps is not possible At the same time, any injured portions of the surrounding scalp may be covered with free skin grafts Temporary advancement of a scalp flap in order to save detached bone and permit coverage with a free skin graft later may be advantageous in traumatic cases as well as in the removal of neoplasms (Fig 324)

If exposed cranial bone is fractured in simple or comminuted fashion, any immediate care of the scalp should be done with the close co-operation of a neurosurgeon (Fig 325)

Adequate treatment of malignant tumors of the scalp not infrequently demands exposure and even removal of portions of cranial bone When such lesions extend onto the periosteal surface, the bone should be thoroughly cauterized, and if there is any question regarding its being invaded, removal of the full thickness of the cranial wall should be carried out If this is done, judicious covering with a scalp flap may be effected or a free skin graft may be applied to the entire wound including the dura Often, in such cases, it has seemed safer to apply a sterile dressing and leave the wound open for close observation for some months In this event the exposed bone will sequestrate and can be removed after several months, when a scalp flap may be applied for repair and the donor area of the flap covered with a split-thickness skin graft The latter procedure is more conservative but it involves more prolonged morbidity Not infrequently, more malignant tumors invade cranial bone and necessitate its removal even down to or including the dura Here, dura or brain tissue should be covered by rotation of a scalp flap In extreme conditions the dura



FIG 324 *a* Bipedicled scalp flap brought forward over forehead as temporary covering following removal of recurring fibrosarcoma of frontal region An area of radio-translucence had suggested involvement of the frontal bone, however, craniotomy showed this to be due to a large pacchionian body Accordingly, the plate of bone was replaced and the scalp flap used in order to save it *b* Result following return of scalp flap and skin grafting of wound in forehead No recurrence of fibrosarcoma 23 years later

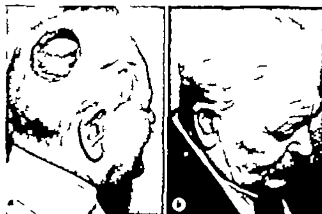


Fig 325 a Scalp and cranial defect resulting from severe electrical burn and extradural abscess. *b* Result following sequestrectomy and repair with scalp flap and skin graft.

may be covered temporarily with a free split-skin graft. As a secondary procedure any free graft may be excised and hair bearing scalp can be rearranged (Figs. 326 327 and 328)

III Total Scalp Losses

This deformity is the one that has been most frequently discussed in the literature and emphasis of only certain points need be made here.

The deformity has thus far left little alternative to handling of the hair problem. The practically total loss of hair precludes any surgical rearrangment of hair bearing scalp tissue and a wig has to be worn. The point for emphasis here is the importance of saving hair from the avulsed portion of scalp for use in preparation of a wig Certainly the patient is better off psychologically if wearing hair of a color and texture with which he is familiar

The free avulsed scalp should not be replaced for it will not survive Some authors have suggested covering the scalp wound with thick split grafts taken from the avulsed portion of scalp However uniformly successful takes with significant growth of hair have not been reported Osborne in 1950 experimenting with small pigs showed that free split-skin grafts 0.04 inch thick would bear hair and said that hair might be expected to grow from grafts as thin as 0 015 inch While the attempt to use free split thickness grafts from the avulsed portion of scalp in these cases would not be criticized too severely the question of significant growth of hair from free grafts needs further experimental development

In total avulsions of the scalp the greater problem is that of epithelial coverage of the scalp wound When avulsion does not injure the periosteal layer the wound is best covered immediately with free split-skin grafts. However when avulsion has included the periosteal layer the exposed bone must be covered immediately to prevent bone necrosis. Here again, one may expose bone marrow and await granulation, or preferably apply free split thickness skin grafts directly upon the marrow

For immediate coverage of the totally avulsed scalp free skin grafts from the abdomen, thigh and the like have proved most valuable Experience has shown that whereas the thin split



Fig 326 *a* and *b* Recurring basal cell epithelioma of face, cranium and dura *c* Result of delayed repair with forehead-scalp flap and skin graft and subsequent insertion of tantalum plate

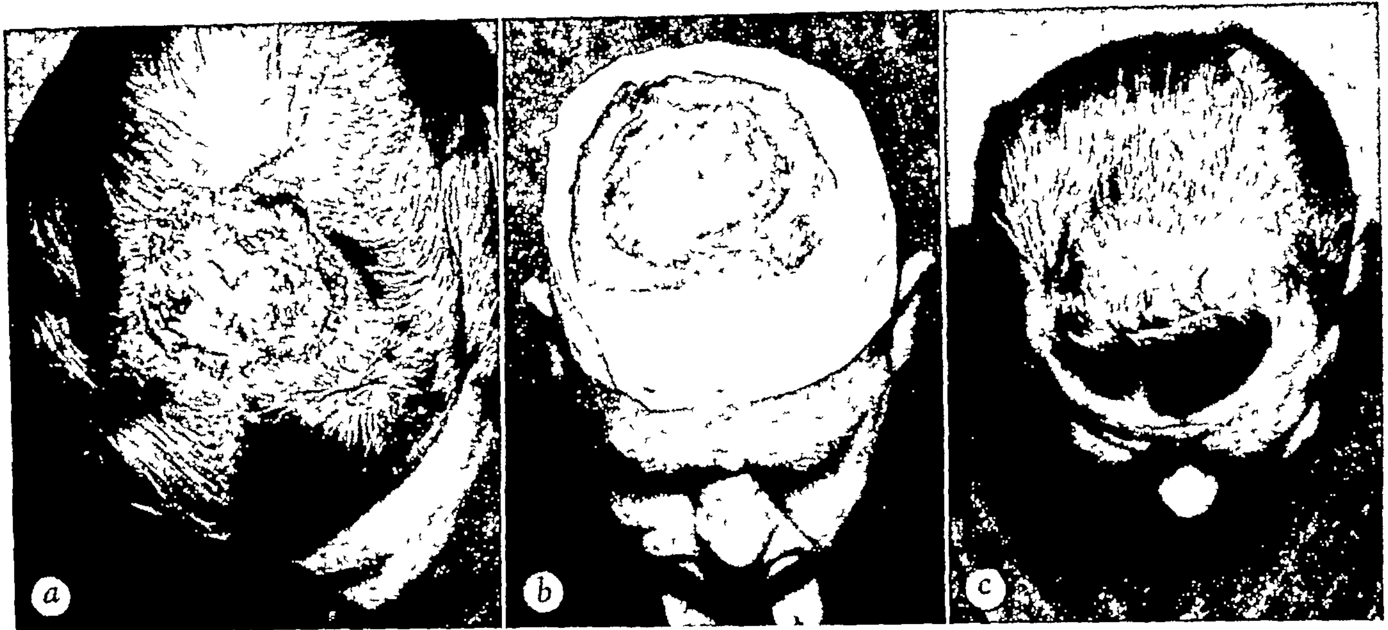


FIG 327 *a* Recurring basal cell and grade 1 squamous cell epithelioma of scalp and cranium *b* Wound following surgical removal and irradiation of dura *c* Result following delayed repair with scalp flap and skin graft Patient free from recurrence and in excellent health at last report 3 years after operation

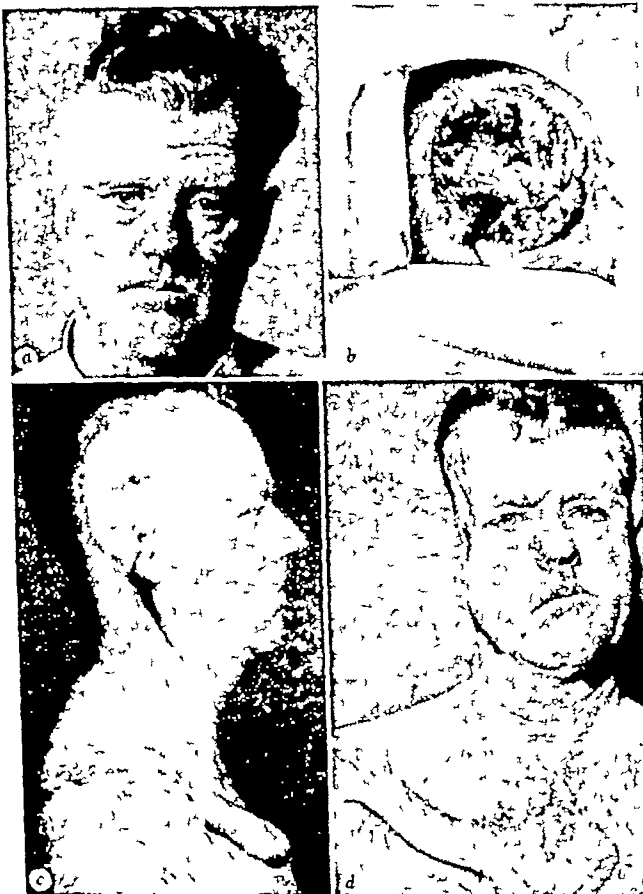


FIG 328 *a* Extensive recurring squamous cell epithelioma, grade 2, of ear, scalp and cranium *b* Immediate operative defect Note wide area of exposed dura *c* and *d* Wound covered with skin graft which was subsequently replaced with a subclavian flap Patient free of neoplasm more than 5 years after operation

thickness graft may theoretically "take more readily," thicker split-skin grafts better stand the wear-and-tear irritation of a wig It is not unusual to find in the case of totally avulsed scalps that skin grafts originally applied have, over a period of several months, ulcerated in certain areas While lotions and other softening agents may help in part to prevent such ulceration, we know today that it is important to provide as thick a skin cover as possible over the large, hard, bony surfaces The eventual coverage of the scalp with pedicled skin is an alternative treatment but this of course should follow initial protection of exposed cranium with free grafts

SUMMARY

Deformities of part or all of the scalp present the problems of (1) establishing hair distribution and (2) providing protective covering for cranial bone and underlying structures This paper presents an approach to these problems based on the utilization of four surgical procedures that have proved to be most successful over the years These procedures (1) direct approximation of wound edges primarily or following serial excisions of a defect, (2) free skin grafting, (3) rotation or advancement of adjacent hair-bearing scalp flaps and (4) trans-

fer of pedicled flaps from remote areas to the scalp

REFERENCES

1 Davis J S Scalping accidents Johns Hopkins Hosp Rep., 16 257-302 1911
2. Osborne M P Complete scalp avulsion rational treatment Report of cases experimental basis for production of free hair bearing grafts from avulsed scalp itself Ann Surg 132 198-213 (Aug) 1950

Le Traitement des Malformations du Cuir Chevelu. FREDERICK A FIGI ET A MORGAN STRUTHERS

Les malformations de tout ou partie du cuir chevelu soulèvent d'une part le problème de l'installation de cheveux et de l autre d une couverture protectrice des os du crâne et des formations sous-jacentes Cet article traite de ces problèmes en se basant sur l utilisation de quatre procédés chirurgicaux dont la valeur a été éprouvée pendant de nombreuses années. Ces procédés sont les suivants (1) rapprochement direct des bords de la plaie immédiatement ou après excision en série d'une malformation (2) greffe cutanée libre (3) rotation ou avancement de lambeau chevelu adjacent et (4) transfert de lambeau pédiculé de zone éloignée sur le cuir chevelu

Die Behandlung von Defekten der Kopfhaut. FREDERICK A FIGI UND A MORGAN STRUTHERS.

Defekte der Kopfhaut oder Teile davon bieten folgende Probleme dar (1) die Haarverteilung herzustellen (2) eine Schutzdeckung für den Schädelknochen und die darunter liegenden Gewebe zu beschaffen Diese Darstellung ist ein Vorschlag, wie man an diese Probleme herangehen kann, wenn man sich 4 chirurgische Massnahmen zunutze macht die sich seit Jahren am erfolgreichsten erwiesen haben Diese Massnahmen sind (1) Direkte Annäherung der Wundränder entweder primär oder nach aufeinander folgenden Excisionen eines Defektes. (2) Freie Hauttransplantation (3) Heranbringen von benachbarter behaarter Kopfhaut entweder durch Rotations- oder durch Verschiebelappen. (4) Transport von gestielten Lappen von entfernten Stellen zur Kopfhaut

El *Tratamiento* de las *Deformidades por* "Scalp." FREDRICK A. FIGI Y MORGAN STRUTHERS.

Las deformidades originadas por "scalp parcial o total presentan los problemas de (1) Establecimiento de la distribución del cabello y (2) proveer una cubierta protectora para los huesos craneales y estructuras subyacentes Este trabajo presenta un intento de resolución del problema basado en la utilización de cuatro procesos quirurgicos que han demostrado buen éxito a traves de los años Estos procedimientos son (1) aproximación directa de los bordes de la herida de inmediato o despues de una serie de resecciones del defecto (2) injertos de piel (3) rotación o avance de colgajos de cuero cabelludo de la vecindad y (4) translado de colgajos de áreas lejanas a la lesión

---

Surgical Correction of Extensive Defects of Scalp and Cranium with Autogenous Tissues. J J LONGACRE, M D, *1503 Carew Tower, Cincinnati 2, Ohio, U S A*

Defects of the skull have presented a problem since the earliest records of man. Fallopius[1] reported the use of a gold plate This method was later decried by Paré[2] A bony defect in the skull shows little or no tendency toward repair Though the periosteum, the cancellous diploe between the two tables and the dura all have osteogenic powers the periosteum grows down over the edge of the defect and becomes adherent to the dura

Rarely does the calvarium regenerate and then only in children after a portion of it has been removed for osteomyelitis Attempts to stimulate osteogenesis in the soft tissues over the defect have been unsuccessful. It is well known that ossification of linear fracture of the vault requires months in children while in adults the fracture line becomes invisible only after years On the other hand a fracture through the base of the skull ossifies after a relatively short period This difference in the rate of healing appears to be due to the fact that the calvarium arises as membranous bone while the base is chondral bone

Autogenous bone grafting serves as a skeleton for the regeneration of new bone In the skull the fate of the graft depends entirely upon the speed with which the implanted bone becomes vascularized in its new environment. The cancellous transplant should then prove the most reliable

Though an early attempt in 1670 was made by J van Meekren[3] to repair a cranial defect with dog bone (heterograft) the real interest in repairing defects of the skull with bone followed the fundamental experimental work of Ollier[4] who felt that the periosteum was essential for regeneration. Macewen[5] in 1873 thought that new bone was derived from bone itself while the more recent work of Phemister[6] shows that

osteogenesis occurs from both the periosteum and endosteum and that the bone cells and fibrous content of the haversian canals also participate but to a less extent Gallie and Robertson[7] pointed out that the autogenous grafts should be porous so that the osteoblasts of the interior may obtain the necessary supply of lymph Small pieces of bone should also be packed about thus, increasing the number of surviving osteoblasts According to Mowlem[8] "the size of the individual graft must take cognisance of the known behavior of bone It may not be so large as to preclude vascular penetration to its centre It may not be so small that the normal calcium resorption caused by vascularisation results in collapse of the whole elaborate network which supports the bony cells Compliance with these desiderata can ensure the survival of a high percentage of bone cells, and this will be reflected by evidence of cellular activity within the first fourteen days after transplantation No longer is the inorganic skeleton the rigid bridge which is to be resorbed and slowly replaced Instead it is only the scaffold to carry those cells which can rapidly envelop it with new bone and incorporate it in the new repair"

In humans, the end result in any case depends on the age of the patient, the condition of the graft and surrounding tissues and the sterility of the wound, though it has been shown that fresh autogenous grafts will survive in spite of a complicating infection This is not true if the autogenous graft has been boiled, refrigerated or if a homogenous graft from a bone bank has been added It will then be necessary to remove the bone if there is a draining sinus The banked or boiled bone frequently absorbs

In 1889, Sydel[9] used an osteoperiosteal graft from the tibia which he reduced to small pieces Muller[10] in 1890 used a flap of scalp with a portion of outer table of skull attached Von Hacker[11] in 1903 used a single osteoperiosteal block from the tibia as a cranial graft For the six year period, 1909-1915, Delageniere[12] reported 104 cases of tibial osteoperiosteal grafts with only two failures (less than 2 per cent) Kazanjian and Converse[13] reported successful cranioplasties using osteoperiosteal grafts from the tibia In 1915, Kappis[14] employed full thickness 12th rib with periosteum and fat to cover a dural and skull defect In 1916, Weber and Schmidt[15] reported the use of rib grafts It was R C Brown[16] who suggested splitting the rib, leaving the inner half as protection for the thoracic cavity Fagarasanu[17] in 1937 split the rib to gain more substance Morestin[18] in 1915 used cartilage Westerman[19] in 1916 employed sternum and in 1920 MacLennan[20] used scapula Mauclaire[21] in 1914 used ilium for a cranial defect and Phemister[6] used the outer iliac crest Pickrell[22] in 1921 employed the inner table of ilium for cranial grafts and later in 1947 in a long range follow-up, he concludes there is no doubt that surgically, anatomically and psychologically the patients own tissues make the best restoration

Following World War II, Blocker and Weiss[23] reported the successful use of cancellous iliac bone for mandibular, maxillary and malar defects Macomber[24] used cancellous iliac bone for defects of forehead, nose and chin Soderberg and Mulvey[25] claim that cancellous bone has superior osteogenic properties McClintock and Dingman[26] reported the successful use of autogenous iliac bone in 14 cranioplasties and came to the conclusion that for the defects they encountered "there was enough bone available The contouring was easily achieved and there was good rigidity Slipping or springing did not occur Danger of infection was not as great Foreign body reaction was not as great Bone grafts are more resistant to trauma and there was no complaint of difference in heat and cold as with plate" Kiehn and Grino[27] report the complete relief of symptoms following removal of tantulum plate in three cases and reconstruction with flaps and iliac bone

It is worthy to note that while the use of autogenous bone had been highly successful with the advent of each major war there has been a search for the ideal foreign body (alloplastic substance) to simplify the reconstruction of cranial defects In 1917 Noon[28] reported the use of silver plates in three cases with short term good results Later generalized use of silver revealed its inadequacy with the subsequent removal of most of the silver plates because of its complication of infected sinus, erosion, tattooing of scalp and forehead due to the deposition of the silver salts Lead plates were used only to produce the inevitable plumbism Platinum was used but found too expensive Gold was used and recently two cases were reported in which

the plates were tolerated by the human host 34 and 36 years respectively Celluloid was first used in 1903 by Erdmann[29] and later decried by Pringle[30] in 1937 because of the foreign body reaction.

As the result of these poor follow-up results at the outbreak of World War II surgeons were in general agreement that only autogenous bone obtained from the outer table of the skull rib or ilium was reliable for reconstruction of cranial defects In spite of this the use of tantalum by Pudenz and Odom[31] in 1942 was picked up with such enthusiasm that it was advised as the inert substance with which to protect sutured nerves only to be quickly discontinued as the results were so disastrous Similarly it became the popular method for cranioplasty only to be challenged by the use of plastic substances acrylic and more recently pure polyethylene (which was supposedly more inert)

At first few complications were reported Again time was needed in order to assay the results Elkin and Holbrook[32] analyzing their results at Newton D Baker Hospital reported 12.3 per cent complications in 130 cases of cranioplasty using tantalum plate and 10 per cent complications in 66 cranioplasties with lucite. Lewin, Graham and Northcraft[33] in analyzing the results with tantulum at the Churchill Hospital Oxford, England, stated that while the immediate convalescence was good everyone of the cases required one or more aspirations of serosanguineous fluid Three of four plates removed revealed localized hydrocephalus, nine were removed for infection and of the 51 cases that had epilepsy 21 had their first seizures after cranioplasty Ascroft[34] observed that one-third of the patients with traumatic epilepsy suffered for a few years only and the attacks then ceased This is a very important fact in evaluating an operation such as cranioplasty Weiford and Gardner[35] in 1949 in analyzing 106 cases of tantalum cranioplasty in civilian life report eight deaths and eight implants that had to be removed for exposure or infection.

Lane and Webster[36] in 1947 collected data for the Veterans Administration where 115 tantulum plates were inserted and 52 of these had to be removed. Work[37] in 1949 and Kiehn and Grino[37] in 1953 report later reconstruction of three cases of complications where tantalum had been placed over the frontal sinus and supra orbital region. Scott and Wycis[38] report 18 satisfactory results out of 22 cranioplasties with stainless steel a failure rate of 18 per cent.

With regards to acrylic resin for closure of skull defects Small and Graham[39] reported 24 of 25 cases satisfactory in a series where the longest follow up was 24 months Only one case became infected. The rapid method of Woringer[40] using pentocril and polyethylene are too recent to evaluate their long range results

The ideal alloplastic substance if and when it is found should be inert and have little immediate or late reaction. It must not be epileptogenic or carcinogenic It must be malleable and yet have sufficient rigidity and it should have little or no resistance to X rays.

In contrast to the above late results, Delagénière[12] in 1915 reported 104 cases of tibial osteoperiosteal grafts to defects of the skull with only two failures Grant and Norcross[41] report only three unsatisfactory cases (5.1 per cent) in 58 cases of autogenous bone grafts to the cranium while King and Anderson[42] report only one case (3 per cent) of absorption in 33 bone grafts to the skull Woolf and Walker[43] in a collective review of cranioplasty conclude that defects up to 8 cm in diameter may be repaired with bone. For the repair of large defects for which sufficient bone can be obtained only with difficulty the alloplastic substances are desirable.

Case Report I Several years ago we were called in consultation to see a two-year-old child D O (Fig 329 top left and top right) who had survived 40 per cent total destruction of the skull and its coverings, exposing the coverings of the left cerebrum and cerebellum in the anterior middle and posterior fossae The child appeared quite alert and after the surface infection was finally brought under control the granulating surface was covered with postage stamp grafts (Fig 329 center left) There was an excellent take and soon the entire surface was epithelized. The child was provided with a football helmet which likewise presented its problems. So it was decided to mobilize the scalp from the intact side of a flap (Fig 329 center right) and later rotate this over the defect after having excised the previously grafted area. The exposed pericranium on the right was now reconstructed with deep intermediate grafts removed from the abdomen. After this had been

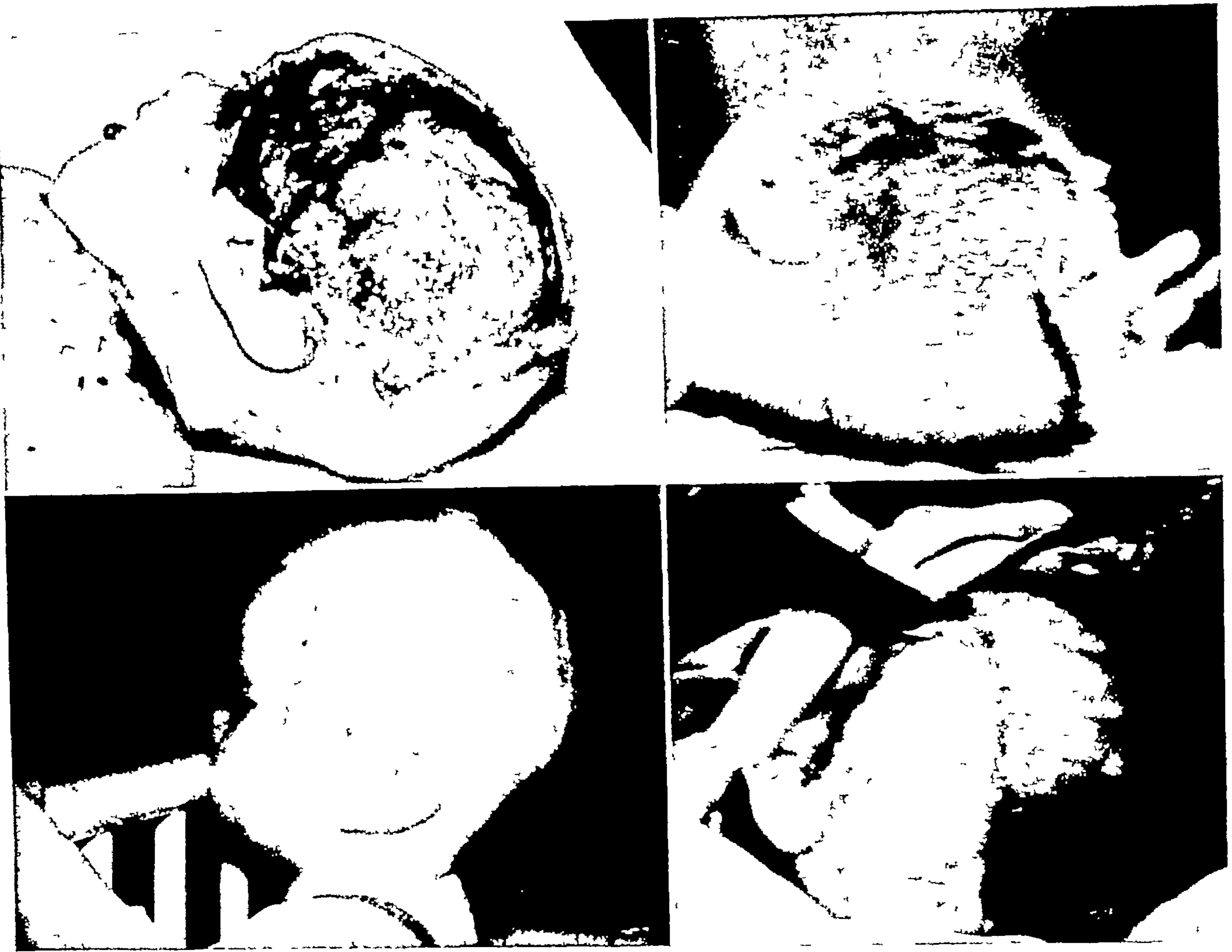


Fig 329 (top left) D O Extensive post-traumatic defect of the cranium and its coverings exposing the dura of the anterior, middle and posterior fossa (Top right) D O Firm red granulations following control of the infection (Bottom left) D O Defect healed by coverage with split grafts (Bottom right) D O Large scalp flap from the opposite side elevated and delayed prior to rotating it into the defect

healed for months and there was no recurring infection it was decided to repair the skull defect Dr Edgar Lotspeich, the neurosurgeon, and the author decided to work as a team

As a result of analyzing our results with 146 autogenous bone and cartilaginous grafts to head and face, we were impressed with the permanance of the autogenous osseous transplant and the manner in which it would stand up under reactivated infection In addition, we had direct evidence of measurements and moulages of the continued growth of these grafts in young individuals observed during the growing period for six to eight years Since the defect in the skull now measured 14 cms, having increased 1 5 cm in diameter during the past year, it was felt that four full length rib grafts taken in four separate operations and then split would provide sufficient autogenous bone This was carried out in stages and even though after two operations there was some purulent drainage from the cerebral wounds, they healed without the extrusion of a single fragment of bone Instead, within a year, there is definite X-ray evidence of osteogenosis extending from the edges of the skull defect to the rib grafts and between the grafts themselves The rib grafts were removed first from the left chest and then the right On subsequent removal of the third and fourth grafts, the resected rib had regenerated so that it was difficult to tell it from its normal neighbor Clinically, the large defect is now reconstructed with solid bone, is not sensitive, nor is there any evidence of fluid or edema The child (Fig 330) has not worn any protective dressing since one month after the last bone graft was inserted The child speaks and plays normally with his brothers and sisters

the plates were tolerated by the human host 34 and 30 years respectively Celluloid was first used in 1903 by Erdmann[29] and later decried by Pringle[30] in 1937 because of the foreign body reaction

As the result of these poor follow-up results at the outbreak of World War II surgeons were in general agreement that only autogenous bone obtained from the outer table of the skull rib or ilium was reliable for reconstruction of cranial defect. In spite of this, the use of tantalum by Pudenz and Odom[31] in 1942 was picked up with such enthusiasm that it was advised as the inert substance with which to protect sutured nerves only to be quickly discontinued as the results were so disastrous Similarly it became the popular method for cranioplasty only to be challenged by the use of plastic substances acrylic and more recently pure polyethylene (which was supposedly more inert)

At first few complications were reported. Again time was needed in order to assay the results Elkin and Holbrook[32] analyzing their results at Newton D Baker Hospital reported 12.3 per cent complications in 130 cases of cranioplasty using tantalum plate and 10 per cent complications in 66 cranioplasties with lucite. Lewin, Graham and Northcraft[33] in analyzing the results with tantulum at the Churchill Hospital, Oxford England stated that while the immediate convalescence was good, everyone of the cases required one or more aspirations of serosanguineous fluid Three of four plates removed revealed localized hydrocephalu nine were removed for infection and of the 51 cases that had epilepsy 21 had their first seizures after cranioplasty Ascroft[34] observed that one-third of the patients with traumatic epilepsy suffered for a few years only and the attacks then ceased This is a very important fact in evaluating an operation such as cranioplasty Weiford and Gardner[35] in 1949 in analyzing 106 cases of tantalum cranioplasty in civilian life report eight deaths and eight implants that had to be removed for exposure or infection.

Lane and Webster[36] in 1947 collected data for the Veteran Administration where 115 tantulum plates were inserted and 52 of these had to be removed. Work[37] in 1949 and Kiehn and Grino[37] in 1953 report later reconstruction of three cases of complications where tantalum had been placed over the frontal sinus and supra orbital region. Scott and Wycis[38] report 18 satisfactory results out of 22 cranioplasties with stainless steel a failure rate of 18 per cent.

With regards to acrylic resin for closure of skull defects Small and Graham[39] reported 24 of 25 cases satisfactory in a series where the longest follow-up was 24 months Only one case became infected. The rapid method of Woringer[40] using pentocril and polyethylene are too recent to evaluate their long range results

The ideal alloplastic substance, if and when it is found should be inert and have little immediate or late reaction. It must not be epileptogenic or carcinogenic. It must be malleable and yet have sufficient rigidity and it should have little or no resistance to X rays.

In contrast to the above late results, Delagénière[12] in 1915 reported 104 cases of tibial osteoperiosteal grafts to defects of the skull with only two failures Grant and Norcross[41] report only three unsatisfactory cases (5.1 per cent) in 58 cases of autogenous bone grafts to the cranium while King and Anderson[42] report only one case (3 per cent) of absorption in 33 bone grafts to the skull. Woolf and Walker[43] in a collective review of cranioplasty conclude that defects up to 8 cm in diameter may be repaired with bone. For the repair of large defects for which sufficient bone can be obtained only with difficulty the alloplastic substances are desirable.

Case Report I Several years ago we were called in consultation to see a two-year-old child, D O (Fig 329 top left and top right) who had survived 40 per cent total destruction of the skull and its coverings exposing the coverings of the left cerebrum and cerebellum in the anterior middle and posterior fossae. The child appeared quite alert and after the surface infection was finally brought under control the granulating surface was covered with postage stamp grafts (Fig. 329 center left) There was an excellent take and soon the entire surface was epithelized The child was provided with a football helmet which likewise presented its problems. So it was decided to mobilize the scalp from the intact side of a flap (Fig. 329 center right) and later rotate this over the defect after having excised the previously grafted area. The exposed pericranium on the right was now reconstructed with deep intermediate grafts removed from the abdomen. After this had been

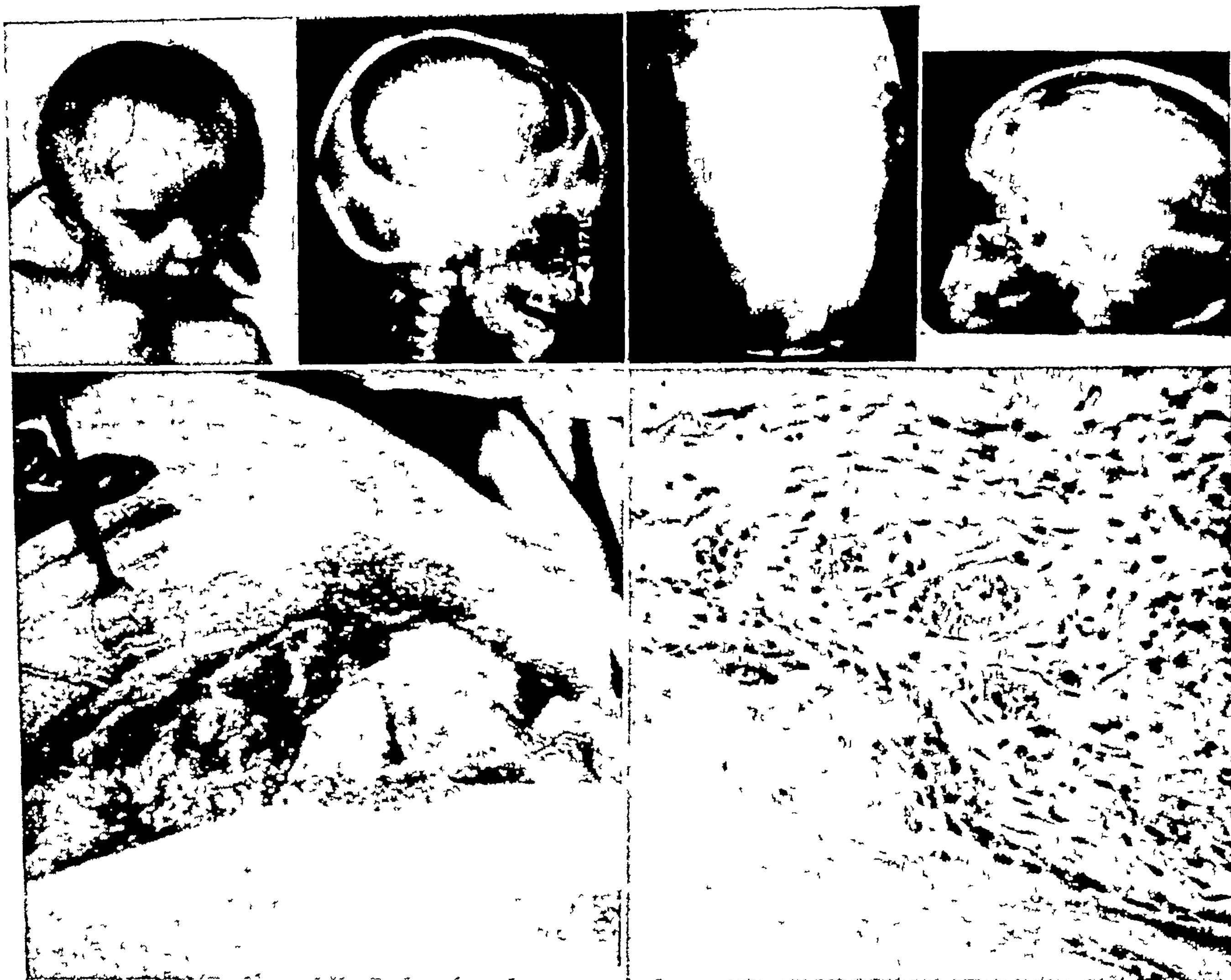


FIG 331 (top left) A 4-year-old child with extensive defect, 14 x 16 cms, on both sides of the skull subsequent to extensive cerebral decompression for acute lead encephalopathy (Top left center) Bilateral cranial defects are bulging, soft and mushy giving the boy the effect of a "puddin-head" (Top right center) R.R AP X-ray of defect showing "satchel-handle" skull (Bottom left) R R Upper graft exposed at the time of insertion of final split rib grafts into defect (Bottom right) R R Photomicrograph of bone graft removed for biopsy purposes 34 days after insertion shows active proliferation along the surfaces of the trabeculae revealing active new bone formation on and between the devitalized trabeculae of the graft (Top right) Lateral view of skull showing defect of the skull 4 months after reconstruction with split rib grafts

There is no evidence of infection" The defect was closed in layers with silk. It is interesting that within this time, the defects already appear more firm and there is no longer any bulging of the cranial contents beyond the skull He was discharged from the hospital two months after his first operation Clinically his repair is quite firm and of good contour X-rays (Fig 331, top right) reveal evidence of vascularization of the new bone grafts The patient appears not only alert but more self assured

Case Report No III E H, a 23-year-old woman presents the method of reconstruction of a tremendous defect including 80 per cent of the scalp, skull and dura by utilizing all of the abdominal skin and subcutaneous tissue as a jump flap attached to the arm Six years previously patient noted a nodular tumor developing on the left side of the scalp This was resected only to recur The tumor (Fig 332, top left) was extremely nodular and showed evidence of having destroyed the entire left side of the skull and half of the right side of the calvarium Biopsy revealed the lesion to be an osteofying fibroma Since the lesion was benign, a large jump flap (Fig 332, bottom left) utilizing all of the abdominal skin was developed in stages and attached to the left arm as vascular carrier,



FIG. 330 D O Child's present condition a year following completion of reconstruction. The defect is now reconstructed with solid bone is not sensitive and there has been no episode of convulsions.

Case Report II More recently we were asked by Dr R. L McLaurin to see a four year-old child, R R. (Fig 331 top left) with an extensive defect 14 x 16 cms, on both sides of his skull after he had survived acute lead encephalopathy He had been admitted in a moribund state to Children's Hospital and an extensive unilateral cerebral decompression was immediately performed without anesthesia. A similar procedure was carried out on the opposite side the following day not only resecting the skull but incising the dura widely and covering it with a polyethylene film. As a result of these procedures the child survived and two years later has an IQ of 90 per cent. One of the resected cranial bone grafts which had been carefully kept in the deep freeze was used to reconstruct one of the defects in the satchel handle skull Unfortunately a severe infection followed, which was resistant to the most intensive antibiotic therapy Osteomyelitis ensued and the refrigerated autogenous bone graft had to be removed The other bone graft which had been stored under the same conditions was thrown away and the child was sent to the convalescent home after all infection had been cleared up

When seen the child was quite alert and co-operative wearing a special helmet to protect the brain underlying the extensive cranial defects. Except for the frontal bone in the forehead region and a satchel-handle" strip of bone, 3 cms wide, to protect the sagittal sinus there was no skull except in the mastoid region to protect the lateral sinus On the left side there was definitely fluid under the flap surrounding the polyethylene film Both defects (Fig 331 top left center) were bulging, soft and mushy giving the boy the effect of a "puddin head. X ray (Fig 331 top right center) revealed slight callous formation along the course of the middle meningeal artery Dr McLaurin and the author worked on this case as a team.

Since our previous child had tolerated the removal of the full length of one rib it was decided to remove the full length of the 8th and 10th ribs at one sitting. They were split and used to reconstruct part of the defect on the left side Twenty four days later the 6th 8th and 10th ribs were removed from the right side. Each of these were split lengthwise to provide sufficient bone to reconstruct the entire defect on the right side of the skull. The rib beds were closed with running sutures and patient was not troubled in any degree with paradoxical respiration. Ten days later the 7th rib was removed from the right thorax. There was evidence of almost complete regeneration of the 8th and 10th ribs at this time The 7th rib was now split lengthwise into three separate grafts These were now contoured and fitted into the defect. The split rib grafts placed 34 days before were found to be solidly incorporated between the dura and scalp and appeared on gross examination to be well vascularized (Fig 331 bottom left) There was no evidence of necrosis or inflammatory fluid One of these was removed for microscopic study One split rib graft which had been implanted 34 days previously was now decalcified and studied. The following is the report of the microscopic examination (Fig 331 bottom right) "The slide contains 3 portions of tissue, all composed largely of cancellous bone with all osteocytes dead and degenerated. On the edges however active new bone formation on and between the devitalized bone spicules of the graft is taking place The marrow in the center is necrotic, but peripherally is being replaced by connective tissue which shows an inflammatory response to necrotic marrow fat.

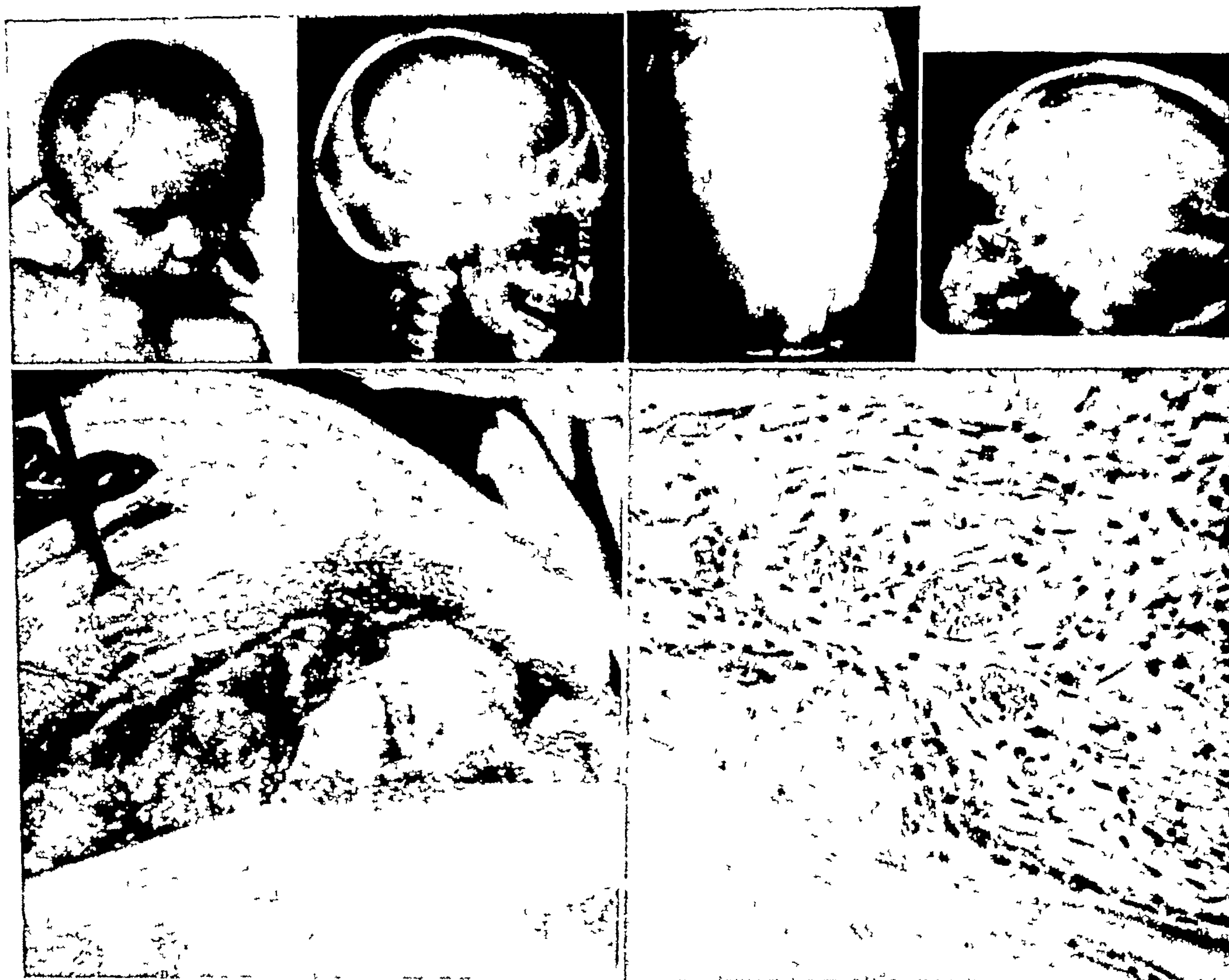


FIG 331 (top left) A 4-year-old child with extensive defect, 14 x 16 cms, on both sides of the skull subsequent to extensive cerebral decompression for acute lead encephalopathy (Top left center) Bilateral cranial defects are bulging, soft and mushy giving the boy the effect of a "puddin-head" (Top right center) R R AP X-ray of defect showing "satchel-handle" skull (Bottom left) R R Upper graft exposed at the time of insertion of final split rib grafts into defect (Bottom right) R R Photomicrograph of bone graft removed for biopsy purposes 34 days after insertion shows active proliferation along the surfaces of the trabeculae revealing active new bone formation on and between the devitalized trabeculae of the graft (Top right) Lateral view of skull showing defect of the skull 4 months after reconstruction with split rib grafts

There is no evidence of infection" The defect was closed in layers with silk It is interesting that within this time, the defects already appear more firm and there is no longer any bulging of the cranial contents beyond the skull He was discharged from the hospital two months after his first operation Clinically his repair is quite firm and of good contour X-rays (Fig 331, top right) reveal evidence of vascularization of the new bone grafts The patient appears not only alert but more self assured

Case Report No III E H, a 23-year-old woman presents the method of reconstruction of a tremendous defect including 80 per cent of the scalp, skull and dura by utilizing all of the abdominal skin and subcutaneous tissue as a jump flap attached to the arm Six years previously patient noted a nodular tumor developing on the left side of the scalp This was resected only to recur The tumor (Fig 332, top left) was extremely nodular and showed evidence of having destroyed the entire left side of the skull and half of the right side of the calvarium Biopsy revealed the lesion to be an osteofying fibroma Since the lesion was benign, a large jump flap (Fig 332, bottom left) utilizing all of the abdominal skin was developed in stages and attached to the left arm as vascular carrier,



FIG 332 (top left) E.H Photograph of patient showing extensive neoplasm involving the scalp skull and dura. (Bottom left) E.H Photograph of extensive jump flap utilizing all abdominal skin. (Top right) E.H. Defect created by radical resection of the tumor Oozing on brain surface was controlled with fibrinfoam packs. (Bottom right) E.H Reconstruction of defect utilizing abdominal flap

This flap was then detached from its last connection with the abdominal wall and found to have excellent circulation. The tumor which involved the scalp calvarium and dura was now resected in two stages by the eminent neurosurgeon, Dr Frank Mayfield and the oozing of the brain surface was controlled with fibrin foam packs (Fig 332 top right) and the huge abdominal flap was now anchored into the defect and found to fit very well. The circulation of the flap remained excellent Figure 332 bottom right, shows the flap in position. The patient, however began to bleed again from the brain surface several hours after the surgery and

expired when they again attempted to control the bleeding Though this patient died because of continued cerebral bleeding, this case points the way to the use of this flap to provide total replacement of the dura and scalp This type of flap would also provide an excellent bed for the later implantation of contoured split rib grafts to reconstruct the skull

Case Report No IV H P, a 50-year-old male, illustrates the absorption of preserved cartilage graft and later permanent correction with autogenous iliac bone Thirty years ago patient had a radical resection of the frontal bone for osteomyelitis On several occasions subsequently, preserved cartilage was inserted only to absorb The patient also developed a severe paraesthesia along the distribution of the right supratrochlear nerve wtih a trigger area in the scar Figure 333, left, shows the extensive irregular defect of the frontal sinus area Through a coronal incision, the defect was exposed and all of the scar removed A block of iliac bone was now removed and carved to fit into the defect reconstructing the entire forehead and glabellar area Figure 333, right, shows the same patient one year following reconstruction The paraesthesia is completely relieved

Case No V M K, a 48-year-old woman illustrates that in certain instances, reconstruction can be accomplished by the contouring of soft tissue alone Seven years previously, M K received intensive X-ray therapy of the left forehead area for basal cell carcinoma, following which she developed an extensive area of X-ray dermatitis, telangiectasia and alopecia (Fig 334, top left) Recently she developed a chronic ulceration in the eyebrow region Due to recurrence of malignancy extending along the pericranium and involving the supraorbital ridge, a radical block resection of the entire area with radical removal of the outer table of the skull and supraorbital ridge was required to completely extirpate the lesion The defect was then reconstructed with an Italian arm flap Figure 334, top right, reveals the final reconstruction attained No bone was required in this instance in order to obtain an excellent functional and cosmetic result

Case No VI A R, a 33-year-old male, illustrates correction of multiple defects with autogenous cartilage grafts (Fig 334, bottom left) A R had sustained a crushing defect of the left forehead, temporal and orbital region with marked depression of the malar and infraorbital plate Nothing was done to elevate the malar and six months later we were asked to correct the defects This was done with carved autogenous cartilage implants and the ptosis of the left eyelid was corrected with the Blaskovics procedure Figure 334, bottom right, shows the degree of improvement attained but also illustrates the tendency of autogenous grafts to curl



Fig 333 (left) H.P Extensive frontal defect following radical resection of the frontal bone for osteomyelitis 36 years previously Patient has had repeated insertions of preserved cartilage grafts, which have subsequently absorbed (Right) H.P The same patient one year following reconstruction of the frontal defect with cancellous bone graft



FIG 334 (top left) M.K. Chronic radio-dermatitis with recurrence of basal cell carcinoma of forehead. (Top right) M.K. Final reconstruction after the outer table of frontal bone was resected along with the soft tissue of the forehead and upper portion of the orbit in order to extirpate the lesion. (Bottom left) A.R. Old traumatic defect of temporo-frontal and orbital region with marked depression of orbit and consequent ptosis. (Bottom right) A.R. Note improvement following correction of the defect with autogenous cartilage and also the tendency of autogenous grafts to curl

Case No VII T C, a six-year-old boy, was struck by a steam roller sustaining a crushing injury of the left frontal and temporal region and middle third of the face (Fig 335, left) Patient developed pneumatocele after the original injury and so the reconstruction work had to be delayed A left dacryocystorrhinostomy was first performed followed by reconstruction of the floor of the right orbit and middle third of the face with autogenous cartilage (Fig 335, center) Moulages made in succeeding years, indicate the continuous growth of the grafts over a period of four years (Fig 335, right) Other cases followed over a 6-8 year period where autogenous bone and cartilage were used have revealed evidence of continuous growth of the grafts as long as the curve of motion of growth was in the ascendancy

Case Report VIII G M, a 77-year-old male presents the problem of the management of an extensive defect over the dura and lateral sinus following radical resection of a heavily irradiated recurrent carcinoma of the ear For fifteen years patient had received radium treatments to a lesion of the left ear Later attempts were made to resect the basal cell lesion but it continued to spread and finally involved the middle ear, temporal bone and parotid region (Fig 336, left) To totally extirpate the lesion it was necessary to resect not only the outer half of the parotid gland, but the mastoid and temporal bone exposing the dura and lateral sinus for a distance of 5 centimeters (Fig 336, right) Because of the previous heavy radiation to the area, it was necessary to provide immediate coverage with a flap This was obtained by mobilizing the skin, subcutaneous tissue and platysma of the entire left side of the neck and rotating it through an angle of 90 degrees into the defect This flap provided excellent coverage and patient returned home in three weeks with the defect entirely healed Because of the age of this patient, no bone graft will be introduced

Discussion and Summary

The history of cranioplasty has been reviewed and the various approaches appraised Woolf and Walker [17] in a collective review on this subject conclude that defects up to 8 cms in diameter may be repaired with bone but that alloplastic substances are desirable for the repair of larger defects

As a result of analyzing our results with 146 autogenous bone and cartilaginous grafts to the head and face, we have been impressed with the permanence of the autogenous osseous transplant and the manner in which it will stand up under reactivated infection in an old traumatic defect In addition, we have direct evidence in measurements and moulages of the continued growth of these grafts in young individuals observed during the growing period for 6-8 years We have also observed osseous defects increasing in size during the growth period

In consequence, we have come to feel that autogenous bone should be used in a growing child no matter how large the defect of the skull



Fig 335 (left) T C Extensive defect of right frontal and orbital region and entire middle third of face following injury by a steam roller six months previously (Center) Patient two months following completion of reconstruction of the defects with autogenous cartilage and prior to dacryocystorrhinostomy (Right) Patient four years after reconstruction with autogenous cartilage, dacryocystorrhinostomy and revision of scars It is interesting that patient's cartilaginous implants have increased in size with the rest of the face



FIG. 336 (left) J.M Extensive involvement of recurrent carcinoma of the ear which has been treated with radium for a period of over 15 years. (Right) Reconstruction attained by immediate insertion of cervical flap to cover the extensive defect of the temporal bone following radical extirpation of carcinoma. This flap was necessary in order to cover the exposed lateral and sigmoid sinuses.

To secure enough bone we have resected full lengths of alternate ribs subperiosteally closing the rib bed On return a month later for more bone we have been impressed with the degree of regeneration. We have been able to find sufficient bone (by resecting 4-6 full length ribs and splitting them lengthwise into two or three layers) to reconstruct defects of from 40 to 60 per cent of the calvarium Clinical follow-up and biopsy reveal the survival of the cancellous transplants and rapid production of new bone in the tissues adjacent to the grafts Serial X rays reveal the gradual development of new bone from the skull to the grafts and between the grafts themselves resulting in a firm protective layer of cancellous bone over the underlying brain

Methods are also presented illustrating the management of total loss of 40 to 80 per cent of the scalp with local and extensive jump flaps The manner of reconstructing defects in the frontal sinus region is likewise illustrated with case reports utilizing only autogenous tissues. The method of handling extensive defects over the dura as a result of extirpation of skull invaded with recurrent irradiated carcinoma is, likewise illustrated

REFERENCES

1 Fallopius, G Opera omnia, Vol I Francofurti, A. Wecheli, 1600
2. Paré A. Works of Paré London R. Cotes 1649
3 Van Meekren J Observationes medicochirurgical 392 pp., 6 pl. Amsterdam Henrici and T Bloom, 1682
4 Ollier L. Gaz méd de Paris, 30.226 1859
5 Macewen, W Lancet 1 881-883 1885
6 Phemister D B Surg., Gynec. and Obst., 19 303-333 1914.
7 Gallie, W E., and Robertson, D E. J A. M A 70 1134-1140 1918.
8 Mowlem R. British J Plastic Surgery 4 231 234 Jan. 1952.
9 Sydel Zentralbl. f Chir 16 209-211 1889
10 Muller W Zentralbl. f Chir 17-65 1890
11 Von Hacker Beitr z klin. Chir., 37 499-510 1903
12. Delagénière Y Surg Gynec. and Obst., 30 441-447 1920
13 Kazanjian V H., and Converse J M Arch of Otolaryngol 31 94 1940
14 Kappis, A Zentralbl. f Chir., 42 897-898, Dec 1915

15 Weber and Schmidt Beitr z klin Chir, 98 604, 1916
16 Brown, R C M J Australia, 11 409-411, 1917
17 Fagarasanu, I Tech chir Paris, 29 57-64, 1937
18 Morestin, H Bull et mém Soc chir de Paris, 41 1994-2046, 1915
19 Westermann Zentralbl f Chir, 43 113-115, 1916
20 MacLennan, A Glasgow, M J, 93 251-255, 1920
21 Mauclaire Bull Soc de Chir de Paris, 40 113-115, 1914
22 Pickerill, H P British J Surg, 35 204, Oct 1947
23 Blocker, T G, and Weiss, L R Ann of Surg, 123 622-640, 1946
24 Macomber, D W. Plast & Recons Surg, 4 157-162, 1949
25 Soderberg, B N, and Mulvey, J M Plast & Recons Surg, 2 191-206, 1947
26 McClintock and Dingman, R Surgery, 30 955-963, December 1951
27 Kiehn, C L, and Grino, A Am J of Surg, 85 395-400, 1953
28 Noon Lancet, 1 373, 1917
29 Erdmann Ann Surg, 36 607, 1903
30 Pringle, J H Brit M J, 1 246, 1937
31 Pudenz, R H, and Odom, G L Surg, 12 318-344, 1942
32 Elkin and Holbrook quoted by J C White, Ann Surg, 128-743, 1948
33 Lewin, W, Graham, M P, and Northcraft, G B Brit J Surg, 36 26, 1948
34 Ascroft, P B Brit M J, 1 739, May 1941
35 Weiford and Gardner, W J J Neurosurg, 6 13-32, Jan 1949
36 Lane and Webster J Neurosurg, 4 526, 1947
37 Work, W P J A M A, 141 977, 1949
38 Scott, M, and Wycis, W T J Neurosurg, 3 310, 1946
39 Small, M C, and Graham, M P Brit J Surg, 33 106, 1945
40 Wominger Rev Neurol, 83 527-535, 1951
41 Grant, F C, and Norcross, N C Ann Surg, 110 488-512, 1939
42 King, J C, and Anderson, G C South M J, 13 719-733, Oct 1920
43 Woolf and Walker Cranioplasty, Collective Review, International Abstracts of Surg, 81 1-23, 1945

Correction Chirurgicale des Pertes de Substance Etendues du Cuir Chevelu et du Crane à l'Aide de Tissus Autogènes. J J LONGACRE

En passant en revue une importante série de reconstruction de la face et de la tête, l'auteur a été impressionné par la persistance de greffes osseuses et cartilagineuses autogènes, ce qui contraste avec la variabilité d'absorption des greffes homologues et la plus grande fréquence des complications que cela entraîne quand on utilise des corps étrangers tels que le tantale, l'acier inoxydable et l'acrylic, complications qui consistent en collection de sérum, infection, gêne aux températures extrêmes, réaction de corps étrangers et quelquefois exclusion De même à la suite de mesures soigneuses et de moulage en série, l'auteur a pu se rendre compte de la croissance des greffes autogènes chez ses malades les plus jeunes qui ont été suivis pendant une période de huit ans

Présentation d'un groupe important de malades adultes chez lesquels d'importantes pertes de substance ont été corrigées par des lambeaux avec rotation, des lambeaux tubulés pédiculés de Gillies et d'importants lambeaux cruentés à distance pour remplacer les plus ou moins grandes pertes de cuir chevelu avant d'y greffer de l'os iliaque autogène

L'auteur est particulièrement frappé de la nécessité d'utiliser des greffes autogènes chez l'enfant Présentation de cas illustrant la méthode de reconstruction dans le cas de destruction combinée de 40% du crâne et du cuir chevelu et aussi la méthode de reconstruction dans le cas de 65% de perte de la voûte crânienne

Chirurgische Deckung ausgedehnter Defekte der Kopfhaut und des Schadels mit Autogenem Gewebe. J J LONGACRE

Bei der Übersicht uber eine grosse Anzahl von Wiederherstellungsoperationen am Gesicht und Kopf wurden wir von der Dauerhaftigkeit des autogenen Knochen- und Knorpeltransplantates beeindruckt im Gegensatz zu den verschiedenen Graden von Absorption homologer Transplantate und der Zunahme von Komplikationen (wie Serumansammlung, Infektion, Beschwerden bei extremen Temperaturen, Fremdkorperreaktion und gelegentlicher Ausstossung) beim Gebrauch von alloplastischem Material (wie Tantal, nicht rostender Stahl und Kunststoffplatten) Wir haben ausserdem mit sorgfaltigen Messungen und Serienmoulagen Wachstum and den autogenen Transplantaten bei den jungeren Altersgruppen uber einen Zeitraum von acht Jahren beobachten konnen

Eine Gruppe von Fallen soll vorgestellt werden, bei denen grossere Defekte bei Erwachsenen mit Rotationslappen, Gillies-Rundstiellappen oder grossen Wanderlappen gedeckt werden, um die verschieden grossen Substanzverluste der Kopfhaut vor der Transplantation von autogenem Knochen vom Ilium zu ersetzen

Bei Kindern sind wir besonders von der Notwendigkeit, autogene Transplantate zu benutzen, uberzeugt Falle werden vorgestellt, die die Methode des Ersatzes bei 40% kombinierter Kopfhaut- und Schadelzerstorung und die Methode des Ersatzes von 65% Verlust des Schadeldaches zeigen sollen



FIG. 336 (left) J.M Extensive involvement of recurrent carcinoma of the ear which has been treated with radium for a period of over 15 years. (Right) Reconstruction attained by immediate insertion of cervical flap to cover the extensive defect of the temporal bone following radical extirpation of carcinoma. This flap was necessary in order to cover the exposed lateral and sigmoid sinuses.

To secure enough bone we have resected full lengths of alternate ribs subperiosteally closing the rib bed On return a month later for more bone we have been impressed with the degree of regeneration. We have been able to find sufficient bone (by resecting 4-6 full length ribs and splitting them lengthwise into two or three layers) to reconstruct defects of from 40 to 60 per cent of the calvarium. Clinical follow-up and biopsy reveal the survival of the cancellous transplants and rapid production of new bone in the tissues adjacent to the grafts Serial X rays reveal the gradual development of new bone from the skull to the grafts and between the grafts themselves resulting in a firm protective layer of cancellous bone over the under lying brain.

Methods are also presented illustrating the management of total loss of 40 to 80 per cent of the scalp with local and extensive jump flaps. The manner of reconstructing defects in the *frontal* sinus region is likewise illustrated with case reports utilizing only autogenous tissues The method of handling extensive defects over the dura as a result of extirpation of skull invaded with recurrent irradiated carcinoma is, likewise, illustrated.

REFERENCES

1 Fallopius, G Opera omnia, Vol I Francofurti, A Wecheli, 1600
2 Paré A. Works of Paré London R. Cotes, 1649
3 Van Meekren J Observationes medicochirurgical, 302 pp., 6 pl. Amsterdam Henrici and T Bloom, 1682
4. Ollier L. Gaz méd. do Paris 30 226, 1859
5 Macewen W Lancet, 1 881-883, 1885
6. Phemister D B Surg., Gynec. and Obst., 19.303-333 1914.
7 Gallie W E and Robertson, D E. J A M A 70 1134-1140 1918.
8. Mowlem R. British J Plastic Surgery 4.231 234 Jan 1952
9 Sydel Zentralbl f Chir., 16 209-211 1889
10 Muller W Zentralbl. f Chir., 17-65 1890
11 Von Hacker Beitr z. klin. Chir., 37 499-510, 1903
12 Delagénière Y Surg Gynec. and Obst., 30 441-447 1920
13 Kazanjian, V H and Converse J M Arch. of Otolaryngol., 31 94 1940
14 Kappis A Zentralbl f Chir., 42.897-898, Dec. 1915

VIII

OESOPHAGUS

Retrosternal Artificial Oesophagus Made of Jejunum Loop. B A PETROV, M D, Professor, *Chief Surgeon of Sklifosovsky Emergency Surgery Institute, Moscow, U S S R*

In cases of scar strictures of oesophagus resulting from caustic alkali or acid burn, the patient is compelled to take food exclusively through a gastrotomy Therefore, the problem of restoring peroral feeding is of major importance

In the Soviet Union the method of choice is to build up an antethoracic oesophagus of a loop of the small intestine The first complete operation of this kind was performed in 1907 by our countryman, the famous P A Herzen The latter applied the experience of his teacher Roux of Lausanne, who had performed such an operation earlier in 1906, but brought it to final perfection only 5 years later

Today such operations find wide and successful application throughout the world

In the Sklifosovsky Institute Professor S Judin started making artificial oesophagi in 1928 In subsequent years this has become a centre of attraction for all patients requiring such an operation

Together with other surgeons of the Institute we have made over 210 operations of the said type in the last five years and—have considerably perfected the operative technique

At present we distinguish three methods of conducting this operation

1 Until recently the artificial oesophagus of small intestine was located subcutaneously,

2 Since 1947 the loop of the small intestine has been placed within the thorax,

3 Finally, after 1952, a third method has been developed Namely, the small intestine is passed through the anterior mediastinum, behind the sternum Thus we obtain a retrosternal oesophagus

As I have mentioned already, the first method leads to the formation of an antethoracic, subcutaneous artificial oesophagus In all cases the oesophagus should preferably be made of the small intestine

We personally have never employed a total dermal tube, and only once resorted to subcutaneous transplantation of a section of the large intestine We have never used the stomach for this purpose

In mobilizing the small intestine the peril arises of the extracted loop becoming necrotic Consequently, the operation needs experience, caution and skill in ligation of main blood vessels As proposed by Roux Herzen-Judin, the artificial oesophagus is formed of the initial loop of the jejunum After ligating 2-3 of the direct mesenteric vessels, the intestine is severed at a distance of 12-15 cm from the plica duodenojejunalis and transposed upwards The afferent section is sutured to the side of the extracted loop

The surgeon generally strives to draw the

TABLE I

Artificial oesophagus of small intestine

Antethoracic oesophagus of small intestine		
1941-1948	Prof S Judin	264 patients, mortality 9%
1949-1953	Prof B Petrov Prof D Arapov Prof B Rosanov	260 patients, mortality 4,6%
Retrosternal oesophagus of small intestine		
1952-1955	Prof B Petrov Prof P Androsov	37 patients, mortality 8%

Correccion Quirurgica de Extensos Defectos de Cuero Cabelludo y Craneo con Tejidos Autogenos. J J LONGACRE.

En la revisión de una gran serie de reconstrucciones de la cara y cabeza, hemos sido impresionados con la buena supervivencia del cartílago y hueso autógenos transplantados en contraste con la absorción variable de injertos homólogos y con la cantidad de las complicaciones que presentan éstos ultimos (colección de suero infección fiebre reacción a cuerpo extraño y eliminación ocasional) así como con el uso de substancias extrañas (placas de tántalo acrílico y acero inoxidable) Nosotors hemos observado mediante medición cuidadosa y seriada, la evidencia de crecimiento en los injertos autógenos en nuestro grupo de pacientes jóvenes observados en un período de más de ocho años.

Presentamos un grupo de casos en el cual se corrigieron grandes defectos en adultos mediante colgajos rotatorios tubos pediculados o colgajos migratorios para substituír pérdidas de substancia de cuero cabelludo de tamaños diversos antes de hacer el injerto autógeno con hueso ilíaco

Hemos quedado muy impresionados con la necesidad de usar injertos autógenos en los niños Presentamos casos ilustrando el método de reconstrucción de una pérdida de substancia combinada de cuero cabelludo y hueso craneal de 40% de extensión, así como el método de reconstrucción de una pérdida de substancia del 65% de substancia craneal

exactly like healthy people and may accept any variety through the mouth

The sum of our experience permits us to conclude that the most satisfactory method of making an artificial oesophagus is by means of mobilizing the small intestine

The extraction of the intestine is greatly facilitated by mobilization of the radix mesenterii

The most progressive method—is that of intrathoracic retrosternal oesophagus

Oesophage Artificiel Rétrosternal Fabriqué a l'Aide d'Une Anse Jéjunale. B A Petrov

Au cours des 5 dernières années, on a effectué à l'Institut chirurgical d'Urgence Skifosovsky 300 oesophagoplasties Dans la majorité de ces cas, on a créé une oesophage *préthoracique* à l'aide d'une anse jéjunale

Etant donné le développement de la chirurgie thoracique, il est actuellement possible d'amener l'anse jéjunale dans la cavité pleurale et de l'anastomoser avec l'oesophage dans le thorax audessus de la sténose superficielle 27 opérations de cet ordre ontété effectuées avec une mortalité de 30%

Le risque fatal est la nécrose de l'anse qui peut survenir par constriction au niveau de sa traversée diaphragmatique

L'auteur installe maintenant son anse jéjunale *sous le sternum* Cette méthode est plus simple et est moins dangereuse Sous anesthésie intratrachéale, cette opération fut effectuée sur 32 malades et il n'y eut que 3 décès

L'Avantage de l'oesophagoplastie *sous-sternale* est évident, car on peut en faire bénéficier la plus grande partie des malades qui présentent des sténoses de l'oesophage une fois qu'on a mobilisé la racine du mésentère

On fait une courte description de la méthode et on expose ses complications, ses échecs et ses résultats

Retrosternale Kunstliche Speiserohre aus einer Jejunumschlinge. B A Petrov

Wahrend der letzten funf Jahre wurden im Skifosovsky-Chirurgischen Unfallsinstitut 300 Oesophagusplastiken ausgefuhrt In der Mehrzahl dieser Falle wurde eine *antethorakale* Speiserohre aus einer Jejunumschlinge gebildet

Dank der grossen Entwicklung der Thoraxchirurgie ist es heute moglich, die Jejunumschlinge in die Pleurahohle einzubringen und mit dem Oesophagus innerhalb des Thorax oberhalb der Narbenstruktur zu vereinigen 27 solcher Operationen wurden mit einer Mortalitat von etwa 30% ausgefuhrt

Das Risiko des todlichen Ausganges liegt in der Nekrose der Schlinge, die infolge Abschnurung an der Stelle, wo sie durch das Zwerchfell eingefuhrt wurde, entstehen kann

Zur Zeit fuhren wir die Jejunumschlinge substernal hindurch Diese Methode ist einfacher und weniger gefahrlich Unter Intubationsnarkose wurden 32 solcher Operationen ausgefuhrt, wovon drei Patienten starben

Der Vorteil der substernalen Oesophagusplastik ist offensichtlich, denn sie kann bei der Mehrzahl von Patienten mit Strikturen des Oesophagus nach der Mobilisierung der Radix mesenterii ausgefuhrt werden

Eine kurze Beschreibung der Methode, der Komplikationen, der Fehlschlage und der Ergebnisse der Operation wird gegeben

Esofago Retroexternal Artificial Hecho con Asa del Yeyuno. B A Petrov

Durante los últimos cinco años, se hicieron 300 esofagoplastías en el Instituto de Cirugía de Emergencia de Skifosovsky En la mayoría de los casos se hizo un esofago ante-torácito tomado del asa yeyunal

Debido al amplio desarrollo de la cirugía torácica, es posible ahora traer el asa yeyunal a la cavidad pleural y anastomosarla al esófago por encima de la cicatriz obstructiva Se hicieron 27 operaciones con una mortalidad del 30%

El riesgo fatal es la necrosis del asa yeyunal, lo cual proviene de la constricción del sitio por donde se pasa al diagragma

Ahora conducimos el asa yeyunal por debajo del esternon. Este método es mas simple y menos peligroso Bajo anestesia traquell la operación y de 32 pacientes 3 murieron El adelanto con la esofagoplastía subesternal es evidente, ya que se puede aplicar a la mayoría de los pacientes, con dichas constricciones del esófago despues de la movilización del "Radix mesenterii" (raiz del mesenterio)

Se da una breve descripción del método, de las complicaciones, de las fallas y de los resultados

---

Reconstruction of the Antethoracic Oesophagus.

V Arneri, M D, Assist Professor and I Papo M D, Professor of Surgery, *Military Medical Academy, Belgrade, Yugoslavia*

Since 1894 when Bircher first announced his method of oesophago-dermato-gastroanastomosis, various methods have been introduced, using the colon, intestine, stomach, etc, for the subcutaneous tunnel These methods were employed because Bircher's operation had been seen to result in a large number of fistulae, owing to auto-digestion of the skin by gastric juice, and in a considerable number of cases of stenosis in the area of the gastrostomy The latter methods, however, produced a high per-

intestine as high up as possible in order to join it with the jugular part of the oesophagus but it is just this part of the operation that involves the danger of necrosis.

To eliminate the risk involved in extracting a large loop we proposed in 1949 that the first stage of the operation should include also mobilization of the radix mesenteri. This is performed as follows

When two or three of the mesenteric vessels have been ligated and the surgeon is convinced that the intestine will not reach above the clavicle the caecal cupola is lifted and a slash is made in the parietal peritoneum under it. A cut is also made in the left side of the posterior mesentery Thanks to this the whole mass of the small intestine may be shifted considerably higher so that the loop to be extracted extends higher upwards as well.

The first time we performed this operation was in April 1949 Data concerning the operation were published in 1950 Half a year later C Dubost and E. Bernier also published an account of a similar operation

During the last five years we performed the said operation 120 times with no complications whatever the intestine coming out higher by 10-20 cm.

The described method enabled us in many cases to avoid addition of a dermal tube i.e. to perform an ideal" operation when the whole oesophagus from the neck to the stomach is made of the small intestine.

However the antethoracic oesophagus has also certain shortcomings not only from the esthetic viewpoint (which especially concerns young men and women) but also owing to the fact that after staying for a long time under the skin the intestine becomes dilated and contracts at its lower end, so that the food must sometimes even be pushed through with the hand.

In 1951 our countryman N I Yeremeev of Omsk, suggested an original method of conducting the small intestine from the abdominal cavity to the neck. He passed it substernally through the anterior mediastinum. In Canada such an operation was proposed in 1950 by Robertson and J Sarjeant. For this purpose a passage is made by the blunt method behind the sternum and in front of the heart and main vessels, between the two pleural sinuses Through this passage is conducted the mobilized small intestine.

Yeremeev took a long time to develop his method and published it only in 1951 We started using this method clinically in 1952 and have now acquired an experience of 37 operations Altogether we have lost 3 patients. The operation is conducted under intratracheal anaesthesia.

The small intestine as usual is extracted by means of laparotomy and the diaphragm is immediately incised under the xyphoid Then, carefully moving upwards between the pleural leaves the surgeon keeps as close as possible to the sternum. A passage is made from above the pedicles of the flexor of the head this opening the way to the neck. The operation involves the risk of injuring the sinuses. Only in a third of all cases have we succeeded in avoiding pleural injury, while in all the other patients the pleura was involved in 7 patients—on both sides.

Under intratracheal anaesthesia this complication is of small danger We have lost no patients from pneumothorax.

Another danger is necrosis of the extracted intestine in the retrosternal canal. Indeed, all our fatal outcomes were due to our failing to remove promptly the necrotic intestine which led to mediastinitis To prevent such danger the intestine should be put behind the sternum, only on condition of its adequate blood supply But if it is promptly diagnosed that the upper section of the intestine is devitalised, it must be removed from the passage and placed under the skin, as we were obliged to do ourselves in 4 cases

Among the total 37 patients five were five-year-old children in whose cases the operation proceeded very favourably because the passage was made behind the sternum without any difficulty and the intestine was easily conducted to the neck.

It is to the advantage of the method that it may be applied to the majority of patients with scar strictures of oesophagus. The intestine is hidden deeply where it finds better conditions for functioning than directly under the skin

Numerous heart-function tests by means of electrocardiography have shown that the close proximity of the intestine exerts no influence on the activity of the heart. The patients take food

exactly like healthy people and may accept any variety through the mouth

The sum of our experience permits us to conclude that the most satisfactory method of making an artificial oesophagus is by means of mobilizing the small intestine

The extraction of the intestine is greatly facilitated by mobilization of the radix mesenterii

The most progressive method—is that of intrathoracic retrosternal oesophagus

Oesophage Artificiel Rétrosternal Fabriqué a l'Aide d'Une Anse Jéjunale. B A PETROV

Au cours des 5 dernières années, on a effectué à l'Institut chirurgical d'Urgence Skifosovsky 300 oesophagoplasties Dans la majorité de ces cas, on a créé une oesophage *préthoracique* à l'aide d'une anse jéjunale

Etant donné le développement de la chirurgie thoracique, il est actuellement possible d'amener l'anse jéjunale dans la cavité pleurale et de l'anastomoser avec l'oesophage dans le thorax au-dessus de la sténose superficielle 27 opérations de cet ordre ontété effectuées avec une mortalité de 30%

Le risque fatal est la nécrose de l'anse qui peut survenir par constriction au niveau de sa traversée diaphragmatique

L'auteur installe maintenant son anse jéjunale *sous le sternum*, Cette méthode est plus simple et est moins dangereuse Sous anesthésie intratrachéale, cette opération fut effectuée sur 32 malades et il n'y eut que 3 décès

L'Avantage de l'oesophagoplastie *sous-sternale* est évident, car on peut en faire bénéficier la plus grande partie des malades qui présentent des sténoses de l'oesophage une fois qu'on a mobilisé la racine du mésentère

On fait une courte description de la méthode et on expose ses complications, ses échecs et ses résultats

Retrosternale Kunstliche Speiserohre aus einer Jejunumschlinge. B A PETROV

Wahrend der letzten funf Jahre wurden im Skifosovsky-Chirurgischen Unfallsinstitut 300 Oesophagusplastiken ausgeführt In der Mehrzahl dieser Falle wurde eine *antethorakale* Speiserohre aus einer Jejunumschlinge gebildet

Dank der grossen Entwicklung der Thoraxchirurgie ist es heute moglich, die Jejunumschlinge in die Pleurahohle einzubringen und mit dem Oesophagus innerhalb des Thorax oberhalb der Narbenstruktur zu vereinigen 27 solcher Operationen wurden mit einer Mortalitat von etwa 30% ausgefuhrt

Das Risiko des todlichen Ausganges liegt in der Nekrose der Schlinge, die infolge Abschnurung an der Stelle, wo sie durch das Zwerchfell eingefuhrt wurde, entstehen kann

Zur Zeit fuhren wir die Jejunumschlinge substernal hindurch Diese Methode ist einfacher und weniger gefahrlich Unter Intubationsnarkose wurden 32 solcher Operationen ausgefuhrt, wovon drei Patienten starben

Der Vorteil der substernalen Oesophagusplastik ist offensichtlich, denn sie kann bei der Mehrzahl von Patienten mit Strikturen des Oesophagus nach der Mobilisierung der Radix mesenterii ausgefuhrt werden

Eine kurze Beschreibung der Methode, der Komplikationen, der Fehlschlage und der Ergebnisse der Operation wird gegeben

Esofago Retroexternal Artificial Hecho con Asa del Yeyuno. B A PETROV

Durante los últimos cinco años, se hicieron 300 esofagoplastías en el Instituto de Cirugía de Emergencia de Skifosovsky En la mayoría de los casos se hizo un esofago ante-torácito tomado del asa yeyunal

Debido al amplio desarrollo de la cirugía torácica, es posible ahora traer el asa yeyunal a la cavidad pleural y anastomosarla al esófago por encima de la cicatriz obstructiva Se hicieron 27 operaciones con una mortalidad del 30%

El riesgo fatal es la necrosis del asa yeyunal, lo cual proviene de la constricción del sitio por donde se pasa al diagragma

Ahora conducimos el asa yeyunal por debajo del esternon. Este método es mas simple y menos peligroso Bajo anestesia traquell la operación y de 32 pacientes 3 murieron El adelanto con la esofagoplastía subesternal es evidente, ya que se puede aplicar a la mayoría de los pacientes, con dichas constricciones del esófago despues de la movilización del "Radix mesenterii" (raiz del mesenterio)

Se da una breve descripción del método, de las complicaciones, de las fallas y de los resultados

---

Reconstruction of the Antethoracic Oesophagus.

V ARNERI, M D, Assist Professor and I PAPO M D, Professor of Surgery, *Military Medical Academy, Belgrade, Yugoslavia*

Since 1894 when Bircher first announced his method of oesophago-dermato-gastroanastomosis, various methods have been introduced, using the colon, intestine, stomach, etc, for the subcutaneous tunnel These methods were employed because Bircher's operation had been seen to result in a large number of fistulae, owing to auto-digestion of the skin by gastric juice, and in a considerable number of cases of stenosis in the area of the gastrostomy The latter methods, however, produced a high per-

centage of intestinal necrosis and had a high death rate. For this reason, Lexer introduced the method of combining intestine and skin, thus considerably reducing the number of the above-mentioned complications

In selecting the operative method for our cases we chose that which involved the least risk to life gave the fewest complications and could be performed within the shortest possible period of time.

Our experience of 120 cases of antethoracic oesophagoplasty has shown that given the correct indications Judin s method of oesophago-jejunoanastomosis in two stages (70 cases) or combined intestine and skin plastic (50 cases) gave the least complications and had the lowest death rate. Dermatoplasty which, due to the many disadvantages of Bircher s method was discredited, is being used again more and more for it has been seen that over 50 per cent of cases operated by different methods required supplementary skin plastic (Oehsner) By combining skin and intestine two of the most frequent and most serious complications namely intestinal necrosis and auto-digestion of the skin by gastric juice were reduced to a considerable extent, while death rate was brought down to a minimum

Poisoning by caustic soda is rather frequent in Yugoslavia (about 600 cases annually) because soda is widely used in household work and is thus easily accessible

Analysis of treated cases

Of 250 patients under observation 120 were found to have irreparable stenosis. The remaining 130 cases were treated conservatively by dilatation at ENT units (Fig 337)

All patients, with the exception of war time patients had undergone treatment by dilatation for a considerable period of time. The appearance of late stenosis despite dilatation, confirms Belinoff's opinion to the effect that the anatomic evolution of stricture is an extremely long process that subsequent granulations may appear at any time at the place of stricture maintaining local infection with oedema and spasms and finally ending up in complete stenosis

Diagnostic methods

Oesophagoscopy shows only the level of the stenosis while oesophagography is essential to

ANALYSIS OF THE TREATED CASES

IRREPARABLE STRICTURES 120	ETIOLOGY	CAUSTIC SODA	[illegible]
		[illegible]	[illegible]
	LOCATION	[illegible]	45
		[illegible]	[illegible]
		[illegible]	[illegible]
	SEX	MALE	[illegible]
		FEMALE	[illegible]
	AGE	[illegible]	10 [illegible]
		[illegible]	[illegible] 50
	[illegible]	1 [illegible] YEARS	[illegible] CASES
		5 [illegible]	[illegible]
		5 10	[illegible] —
		[illegible] [illegible] —	15
[illegible] STENOSIS 150	[illegible] AT ENT [illegible]		

FIG. 337 Analysis of treated cases

reveal the degree and length of the narrowed segment. In our 120 cases we found complete stenosis in 90 cases In 30 cases barium was seen to pass through a filiform stricture 6-8 centimeters long

No retrograde oesophagoscopy was made The passage of the oesophagus was checked by administering methylene blue through the mouth and establishing its presence in the stomach contents through the gastrostomy

Indications and contra-indications

Antethoracic oesophagoplasty should be taken into account only when systematic and prolonged dilatation has failed to produce any results or has only achieved partial and temporary passage through the oesophagus. In the latter cases progressive exhaustion of the patients and pulmonary tuberculosis were frequently established.

Whether an operation is indicated or not depends on the degree of the stricture while the operative method itself depends on the level of the stenosis and the age of the patient.

We consider antethoracic oesophagoplasty to be absolutely justified in cases of complete stenosis as well as in cases where despite prolonged conservative treatment the stricture keeps increasing

An exclusive indication for antethoracic oesophagoplasty by combining skin and intestine was stenosis at the level of the first physiological stricture. In these cases Judin s method is not indicated because of the intensive scar tissue in the upper part of the oesophagus and pharynx, which prevents the anastomosis of the oesophagu and intestine.

The most suitable cases for antethoracic oesophagoplasty are those with complete stenosis at the level of the jugulum, for food enters directly into the antethoracic oesophagus, and there is no secondary dilatation of the remaining part of the oesophagus (Fig 338, upper left)

Stenosis of the thoracic segment of the oesophagus is not an indication for antethoracic oesophagoplasty, since the remaining part of the oesophagus usually becomes dilated due to stagnation of food (Fig 338, upper right)



Fig 338 (upper left) Severe stenosis at the level of the jugulum (Upper right) Complete stenosis of the thoracic segment of the oesophagus Note the marked dilatation of oesophagus (Lower left) (Case in Fig 340, lower right) Free passage of barium in Trendelenburg position (Lower center) Severe stenosis at the level of dermatojejunoanastomosis The method of centralizing two lateral flaps was used for covering 1 year ago

Note the enormous dilatation of skin tunnel and filiform passage of barium (Lower right) The case shown in Radiogr 4 after resection of stenotic area End to end anastomosis between skin tunnel and jejunum was done Radiography 6 months after the operation

In regard to age, we considered patients between 5-20 years of age to be most suitable for antethoracic oesophagoplasty No operation on children under three years of age was performed because the mesentery is too short to be brought up without strain and because the presence of many mesenteric glands makes this difficult

In cases where it was possible to draw the intestine up to the middle of the neck, provided there was no scar tissue around the oesophagus, we used Judin's method In cases where this was not possible, dermato-jejunoplasty was performed

Apart from the mentioned cases, dermatoplasty was also performed where intestinal necrosis followed the Judin operation (6 cases) Of late we have had more indications for antethoracic skin plastic because Professor Papo performs total extirpation of the oesophagus by thoracotomy on the right side, since a malignant process had been found in 3 cases at the place of the original stenosis, and since it has been seen that the remaining part of the oesophagus represents a potential danger of chronic oesophagitis which causes serious disabilities to the patient

Before undertaking antethoracic oesophagoplasty it is important to win the confidence of the patient, namely as Grégoire said "Il faut savoir en faire un collaborateur et non une victime"

Operative methods used

1 Antethoracic oesophagoplasty in two stages (Judin's method),

2 Oesophago-dermato-jejunoplasty,

3 Transthoracic resection of the stricture with anteaortal oesophago-gastro-anastomosis

The method of dermatoplasty alone is dealt with here Judin's and other methods, used by Professor Papo, are only mentioned, having been published elsewhere

Construction of skin tunnel

Where the skin was normal we made an inrolled skin tunnel according to the Gillies method Two parallel incisions at a distance of 6 cm from each other are made, lateral flaps of

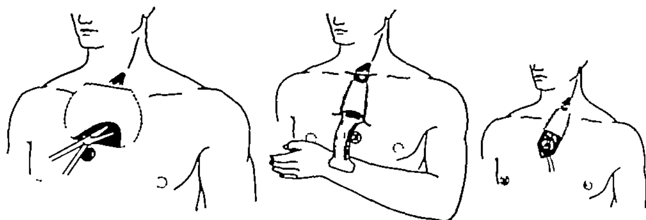


Fig 339

2 cm each are raised, leaving the central part of 2 cm for the basis The flaps are then inrolled to obtain a skin tunnel.

Where hair-bearing or scarred skin was present we made the tunnel by means of an inverted tube pedicle in the following manner The first incision of 5 cm is made 1 cm above the jejunostomy The skin is widely undermined to avoid tension over the inverted tunnel The second incision of 3–4 centimetres is made at the lower edge of the oesophagostomy (Fig 339 left)

The inverted tube is now pulled through to the upper incision where the posterior half of the tube opening is sutured to the corresponding half of the oesophagostomy while its anterior half is sutured to the skin. The opening which remains will later be closed easily by the usual method of local inverted flap (Fig. 339 center)

In the last stage—after 4 to 6 weeks—the tube is cut in two Its inverted part is tubed only to mid level of the jejunostomy while the remaining part of the dermato-jejunoanastomosis is closed with a local inverted triangular flap below the jejunostomy By using this technique the possibility of skin pocket and stenosis is eliminated. Finally the covering is made from the remainder of the tube on the wrist (Fig 339 right Fig 340 upper left)

In cases with keloid scars between the oesophagostomy and jejunostomy we excised the scars and covered the defect with a tube. In the last stage, after 4–6 weeks, one part of the tube is used for the tunnel and its remaining part for *the covering* (Fig 340 upper right, center right and left)

The suturing of the tunnel is done with single subcuticular stitches using fine catgut. In the area of the dermato-jejunoanastomosis, we used silk thread. Of late, we have also been using pull-out nylon stitch

Skin covering

In covering the subcutaneous tunnel we strictly adhered to two basic principles avoiding superposed sutures and tension. The large number of complications cited by Ochsner and Owens in their analysis of 100 cases of dermatoplasty such as fistulae, stenosis, infection, etc., may be ascribed to the method of centralizing two lateral flaps, which was the exclusive procedure applied in those cases. We saw that this method resulted in two complete stenosis (one done in our hospital and one in another unit) as well as in a certain number of fistulae.

In cases where the distance between the oesophagostomy and jejunostomy was less than 10 cm we covered the tunnel with one or two rotation flaps (Fig 340 lower left) If the distance was bigger we used a thoraco-abdominal tube (Fig. 340 lower right Fig. 338 lower left) The longest tube was 32 cm. Tubes under 18 cm were transferred immediately upon the wrist.

We have abandoned the method of centralizing two lateral flaps because of the complications it gave. The best results were obtained by using the tube pedicle.

Upon the completion of the last stage it is of utmost importance to check intensive salivation and occasional intestinal regurgitation. To achieve this one milligram of atropine was administered 3 times a day during the first 3 days, suppressing all food and liquid through the gastrostomy On the fourth day a little milk and tea is given through the gastrostomy while on the seventh day only is regular food allowed.

Liquids through the mouth were given a fortnight after the operation Radiographic examinations with barium were made after 4 weeks The gastrostomy was closed definitely three months later by extra-peritoneal way

Post-operative complications (Fig 341)

(a) Fistulae—11 cases (22 per cent) They appeared most frequently in the area of the dermato-jejunostomy between the 5th-7th day There was spontaneous healing in 9 cases, while in 2 cases, operative treatment was necessary

(b) Stenosis in the area of the dermato-jejunoanastomosis—2 cases (4 per cent) In 1 case, stenosis appeared 5 years after the operation and in the other case (from another hospital) after one year In both cases, skin plastic had previously been performed by centralization of two lateral flaps Severe stenosis at the level of the dermato-jejunoanastomosis was found in both cases (Fig 338, lower center) A thin probe could only pass with difficulty through the stricture The dilatation of the tunnel above the stenosis was enormous The macroscopic appearance was very similar to that of a mucous membrane, folded and humid

Histological findings the sweat glands were preserved while the sebaceous glands had atrophied completely

The passage was restored by a resection of the stenosed area, followed by an end to end anastomosis between the skin tunnel and intestine The post-operative course, was uneventful in one case The gastrostomy was closed three months later after the radiography had shown the normal passage of barium (Fig 338, lower right)

In the second case, a breakdown of the anterior half of the anastomosis occurred while the suture of the posterior wall held well Later, the case was completed successfully by the tube method

As may be seen the number of complications was considerably smaller than mentioned by Ochsner and Owens, according to whom fistulae appeared in 56 per cent of cases, stenosis in 17 per cent, and necrosis of the skin in 9 per cent of cases We had no mortality with the method of oesophagodermato-jejunoplasty (Ochsner cites death rate of 22 9 per cent) All our cases have been completed (Ochsner—65 per cent completed cases)



Fig 340 (upper left) Case shown in diagrams 1, 2, 3, definitely completed (Upper right) Keloid scars between jejunostomy and skin tunnel (Center left) Inserted portion of tube will be used for construction of subcutaneous tunnel The remaining part of the tube on the wrist will be employed for covering (Center right) Case completed (Lower left) Skin covering obtained by method of two rotation flaps The distance between oesophagostomy and jejunostomy was 10 cm (Lower right) Covering by tube pedicle Note the grafted donor area on the right side

The average time of the entire operative skin plastic procedure with tube was 5 months, while with local plastic it was 2 months (according to Ochsner it was 3 years)

The average number of operations with tube was 3 8 while of all others it was 2 3 In dermato-jejunoplasty the death rate was nil All our

POSTOPERATIVE COMPLICATIONS

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			[illegible]
				[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	9	2	[illegible]	EXCELLENT
[illegible]	[illegible]	[illegible]	[illegible]	/	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	/	/	EXCELLENT

Fig 341 Post-operative complications

cases, with the exception of one now in the final stage have been completed.

(c) Subcutaneous abscess 7 cases (14 per cent) Infection appeared between the 3rd-5th day In all cases healing was achieved in a few days

Late results (Fig 342)

The patients were followed up from 1-6 years in regard to

1 The passage of liquid and solid food
2 The passage of barium
3 General condition
4 Blood picture
5 Patients complaints

In 46 cases (92 per cent) the passage of every type of food was absolutely normal

Two patients had to force down solid food while liquid food could run down without difficulty

In two cases with stenosis, liquids too were found to pass with difficulty In both these cases normal passage was achieved after subsequent repair

In 46 cases barium was seen to run freely into the intestine.

RESULTS

	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	([illegible])	([illegible])
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	EXCELLENT	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	

Fig 342 Late results

In 2 cases the passage of barium was a little retarded

In the two cases with stenosis barium passed through a filiform opening while the skin tunnel above the stenosis was enormously dilated.

The general condition of all patients checked subsequently was excellent. The two women *patients with stenosis recovered quickly after* repair

The blood picture in all cases ranged within the limits of normal with the exception of the two cases with stenosis where signs of anaemia were found. Seven patients complained of thoracic pain and sensation of hunger

Summary

Late results are set out of 50 cases of complete corrosive oesophagal stricture treated by dermato-jejunoplasty operated and followed up within a period of 1-6 years. Utmost attention is devoted to strict indications for antothoracic oesophagoplasty which should be undertaken only when prolonged and systematic conservative treatment by dilatation has failed to produce results as well as to the selection of the right operative method. As to diagnosis, radiographic examinations with barium contrast are essential for oesophagoscopy alone does not reveal the degree and length of the narrowed segment Methods used for the construction of *skin tunnel and covering are described* The best results have been obtained with the tube pedicle for with this technique superposed sutures and tension are avoided. Full attention is also given to post-operative treatment after the last stage—dermato-jejunoanastomosis—because complications most often take place at this stage

Complications and their treatment are set out, as well as late results.

Discussion

Dr Allan Ragnell Stockholm Sweden At the annual meeting of the Swedish Surgical Association in 1941 the author demonstrated a new technique for covering the antethoracic skin-tube with the aid of tube-pedicles in reconstruction of the oesophagus In two of the four completed cases the thoracic oesophagus had previously been resected for cancer by another *surgeon. These seem to be the first recorded*

combinations of wide resection for malignant tumour and subsequent antethoracic reconstruction The other two cases concerned corrosive strictures of long standing This method of covering the skin-tube probably constitutes a technical advance in the direction of increased security, especially in those cases where insufficient skin is available in the region of the skin-tube (Acta Chir Scand 1949, 98, 369)

Serafimer Lasarettet,
Stockholm, Sweden

REFERENCES

1 Grégoire, R Chirurgie de l'oesophage, 145, 1935
2 Hanrahan, E M Plastic and Reconstructive Surgery, 2 474, 1947
3 Gillies, H D Vojno San Preg, 5 220, 1950
4 Hilarowicz, H, and Michalowski, E Presse med, 44 705, 1936
5 Herzen, P Zblatt f Chirurgie, 8 219, 1908
6 Ivy, R H, Hawthorne, H R, and Ritter, J A Plastic and Rec Surgery, 3 173, 1948
7 Jianu, J Archivio ital di chir, 52 580, 1938
8 Judin and Lever Munch Med Wochensch, 29, 1911
9 Ochsner, A, and Owens, H Ann Surg, 100 1055, 1930
10 Rowsing, I Ann Surg, 1892, 1952
11 Wulstein Deutsche Med Wochensch, 20, 1904
12 Yarasov, E E Ann Rev Soviet Med, 1 205, 1944
13 Terracol, J Les maladies de l'oesophage, 388, 1938
14 Shaw, M Brit Jour of Pl Surgery, 1950

Reconstruction de l'Oesophage Pré-Thoracique. V ARNERI ET I PAPO

Cet article se rapporte à 50 cas de sténose oesophagienne par brûlure qui ont été opérés à l'aide de diverses techniques de plastie cutanée

Les auteurs insistent sur le fait que l'oesophagoplastie préthoracique ne doit être entreprise que dans les cas de sténose complète ou encore dans ceux où un traitement conservateur long temps poursuivi n'a donné aucun résultat La plastie cutanée se trouve indiquée (a) dans les cas de stenose au niveau du premier rétrécissement physiologique, (b) dans les cas où le mésentère est trop court pour permettre une traction intestinale de l'intestin jusqu'au cou, (c) dans les cas où la nécrose intestinale est survinue après opération de Judine

Trois méthodes ont été divisées pour la reconstruction du tunnel interne (a) les lambeaux cutanés roulés de Gillies dans les cas typiques, (b) le pédicule tubulé inversé introduit sous la peau dans els cas où il existait une peau velue, (c) le pédicule tubulé dans les cas avec cicatrice Après excision des cicatrices, on utilise le pédicule tubulé aussi bien pour le tunnel que pour le recouvrement de la peau dans le temps terminal

Les résultats les plus satisfaisants pour le recouvrement de la peau ont été obtenus par l'utilisation de pédicule tubulé

Il faut faire bien attention dans les soins postopératoires de façon à prévenir toute fistule

Les auteurs décrivent les complications et le traitement et rendent compte de leurs résultats éloignés après six ans de surveillance

Bildung des Antethorakalen Oesophagus. V ARNERI UND I PAPO

Die Arbeit betrifft 50 Falle von Veratzungsstrikturen des Oesophagus, die mit verschiedenen Verfahren von Hautplastik operiert wurden Es wird betont, dass die antethorakale Oesophagusplastik nur in Fallen von vollstandigen Strikturen vorgenommen werden soll oder in solchen, in denen eine langdauernde konservative Behandlung erfolglos war

Hautplastiken sind indiziert (a) in Fallen von Strikturen in Hohe der ersten physiologischen Verengung, (b) wenn das Mesenterium zu kurz ist, um die Eingeweide bis zum Halse heraufzuziehen und (c) in Fallen, wo eine Nekrose des Darmes nach einer Judin' schen Operation eingetreten ist

Zur Herstellung der Innenauskleidung des Rohres wurden 3 Methoden angewandt (a) der Gillies'sche eingerollte Hautlappen, in typischen Fallen, (b) der unter die Haut eingefuhrte, eingerollte Stiellappen, wenn die Brusthaut behaart ist, (c) der Rundstiellappen, falls Narben vorhanden sind Nach der Narbenexzision wird der Rundstiellappen sowohl fur den Schlauch als auch im letzten Stadium fur die hautige Bedeckung benutzt

Bei der Wiede herstellung der Hautdecke wurden die besten Ergebnisse mit dem Rundstiellappen erzielt

Besondere Aufmerksamkeit muss den postoperativen Massnahmen gewidmet werden, um Fistelbildung zu verhindern

Komplikationen, deren Behandlung, wie auch Spatresultate nach 6 jahriger Beobachtung werden beschrieben

Reconstrucción Antetorácica del Esófage. V ARNERI Y I PAPO

Este trabajo comprende 50 casos de estrechez esofágica por caústicos operados por varias tecnicas de plastías de piel

Se señala que la esofagoplastía antetorácica puede ser intentada solamente en casos de constricción completa o cuando un tratamiento conservador usado por tiempo largo no haya dado resultado La plastia de piel esta indicada (a) en casos de constricción a nivel de la primera estrechez fisiológica, (b) cuando el mesenterio es muy corto y no permite llevar el intestino al cuello y

(c) cuando se produce la necrosis del intestino despues de la operación de Judin.

En la reconstrucción del tunel interno se han usado tres métodos (a) los colgajos de piel enrollados hacia dentro de Gillies en casos típicos (b) el tubo pediculado invertido introducido bajo la piel cuando hay pelo en la misma (c) tubo pediculado cuando había cicatriz. Despues que se ha resecado la cicatriz el tubo pediculado se usa para el tunel y en estadio posterior para la cubierta cutánea.

Para la cubierta cutánea el resultado mas satisfactorio se obtuvo usando el tubo pediculado

Se da especial cuidado a las medidas postoperatorias para evitar la fístula

Se describen las complicaciones y su tratamiento asi como los resultados despues de seis meses de observación

---

How to Overcome the Difficulties Arising in Plastic Restitution of Large Pharyngeal and Oesophageal Defects.

HARRY MENNIG, Dr med., *Dozent Jena/Thuringen, Germany*

As many pharyngeal and oesophageal defects are caused by laryngectomy after strong X ray therapy the tissues surrounding the defect often have been severely injured, especially in cases where the tumour dose exceeded the normal amount (Fig. 343 upper left)

Both extraordinary breadth (Fig. 343 upper left center) and size, shape and site of the defect can render the plastic repair more difficult (Fig 343 upper right center)

Unusually large defects are always caused by laryngectomy with transverse resection of the pharynx and of the upper part of the oesophagus very often not only the skin partition of the trachea and of the oesophagus is missing, but there can be a deep defect of tissue between trachea and oesophagus the extent of the defect even reaching as high as to the floor of the mouth increasing the difficulties present (Fig 343 upper right)

Finally extensive scars near the site involved, marked lordosis of the cervical spine and unfavourable relation of the large cervical vessels to the defect render the plastic covering more difficult.

In such cases the plastic surgeon has the difficult task of reconstruction of the pharynx this requires twofold epithelial covering inside and outside he has to restore the function of swallowing and speaking and provide a good *cosmetic result*.

In treating successfully ten patients with large pharyngeal defects we have described the most suitable procedure for all stages of the plastic operation in any particular case. We have previously presented this procedure in detail in a special monograph.[1]

The most important points of this procedure are

1 In all the larger unfavourably situated and complicated defect-plasties *preliminary grafting—of the tube pedicle flap* on the upper edge of the defect is indispensable (Fig. 343 bottom left) Covering the fistula directly is only indicated in cases of medium-sized and small defects.

2 Greater security of successful transplantation of skin can be achieved even at an unusually distant site, when the distal end of the preliminary grafted tube pedicle flap is severed and is allowed to hang free for some time (3-4 weeks) Sufficient blood-supply of the transplanted skin is guaranteed (Fig. 343 bottom left) only by the *provident transfer of the nutrition of the pedicle flap* to the upper end of the flap

3 It is possible to gain *supplemental skin to provide lining* at the time of preparation of the tube pedicle A semicircular cutaneous flap is formed from the submental region which is based at the edge of the defect and is to be applied to the undersurface of the pedicle flap (comp Fig 343 bottom left center) Only where the submental region is very hairy this method will not be indicated.

4. For *the inner repair of the pharynx* the skin nearest the defect is used For that purpose several flaps based at the margin of the defect are formed. But only by stripping off the mucosa of the pharynx and oesophagus and even of the trachea are we able to restore a sufficiently wide pharynx. It is also possible to make use of the remains of muscles of deglutition which, prepared in connection with the mucous membrane and sutured in the midline seem to be important for the partial restoration of the throat-muscle-ring and for the function of swallowing (Fig. 343 bottom left center)

The greatest width of an extensive defect—often to be found in the upper part—receives its inner lining either by means of the supplemental flap obtained as described above from

the submental region, delayed once or twice, or by means of skin from the undersurface of the pedicle flap In this way the pharynx can be reconstructed in every dimension desired, even in defects of great extent (Fig 343, bottom right center)

5 Such a method does not involve any essential difficulties concerning the outer covering, even when there occur large areas resulting from excision of scars, occupying nearly all the surface of the neck When extending the pedicle flap we distribute the subcutaneous tissue of fat enclosing the area of cervical blood-vessels in a thick layer, in the same way we are able to narrow a too large tracheostoma

In all our cases the results of our methods were very good, including restoration of the function of swallowing and speaking and satisfactory appearance (Fig 343, bottom right)

Univ-Ohrenklinik,
Jena Thuringen, Germany

REFERENCE

1 Mennig, H Plastische Deckung grosser Lucken des Schlundes und der Speiserohre durch Rundstiellappen Verlag Volk und Gesund heit, Berlin, 1954

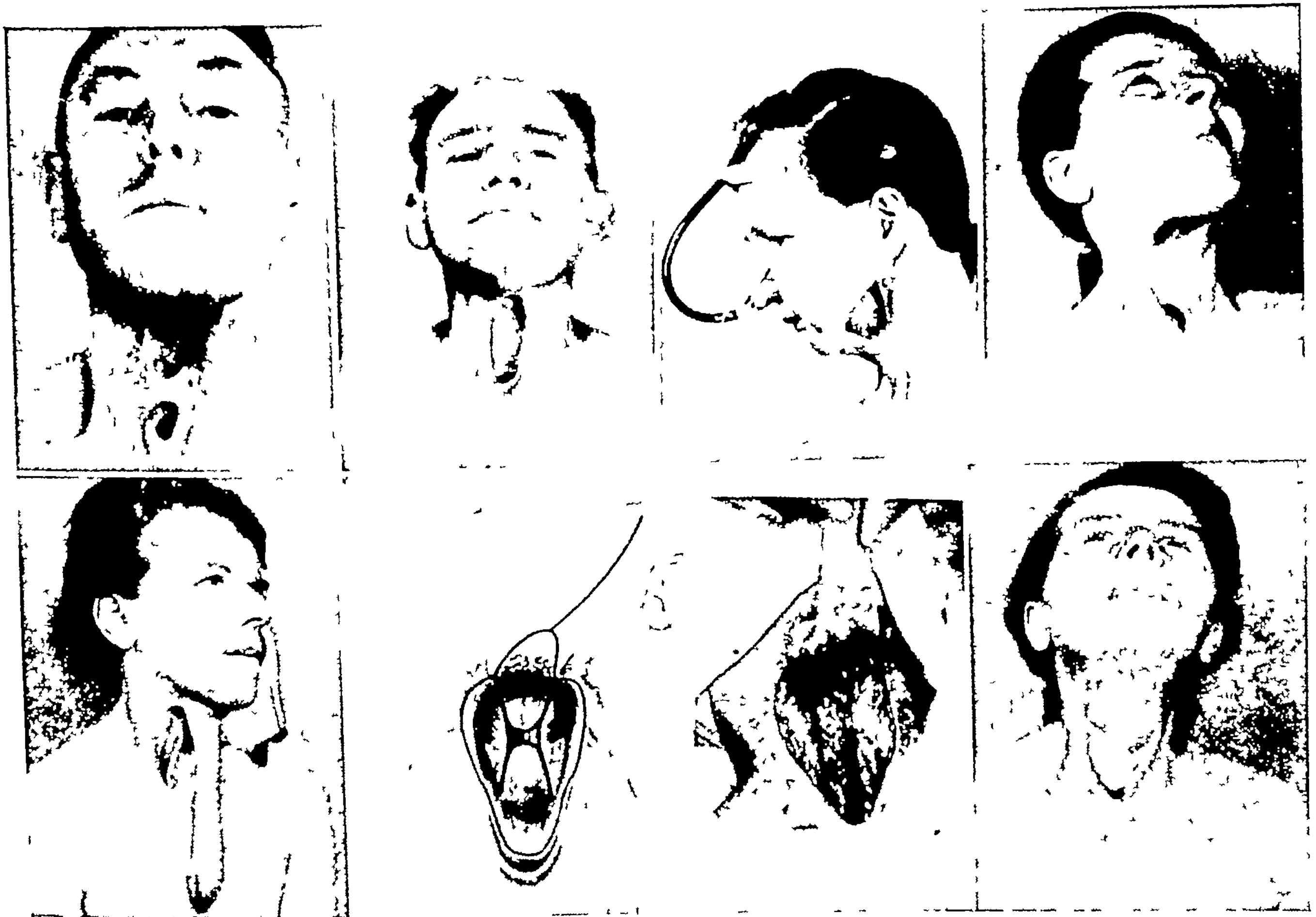


FIG 343 (upper left) Environment of a pharyngeal defect after an overdose of irradiation The skin is thin and atrophic, there are extensive telangiectases (Upper left center) Big pharyngeal defect without skin partition between the tracheostoma and the oesophagostoma with a very large tracheostoma (Upper right center) Large lateral defect of the pharynx triangular in form (Upper right) Very extensive pharyngeal and oesophageal defect resulting from laryngo-pharyngectomy and resection of the floor of the mouth (Bottom left) Long thick pedicle flap from the flank, transported via the upper arm, primarily grafted to the upper edge of the defect, with secured blood-supply by allowing the distal end of the flap to hang freely for 3 weeks (Bottom left center) Scheme of the formation of marginal flaps for the lining repair by widely stripping off the mucosa of the pharynx—the remains of the M constrictor pharyngis included, by means of a skin flap from the submental region (Taken from *MENNIG,* "Plastische Deckung usw," Verlag Volk und Gesundheit, 1954) (Bottom right center) Stage of operation with inner lining completed, showing size of the final defect of skin (Bottom right) Functionally and cosmetically acceptable result of plastic restitution of a large pharyngeal and oesophageal defect resulting from laryngo-pharyngectomy (comp to upper right picture)

Comment Surmonter les Difficultés que l'on Recontre au Cours de la Réparation Plastique de Grandes Pertes de Substance Pharyngo-Oesophagienne. HARRY MENNIG.

Bien que l'emploi de lambeau tubulé pédiculé dans la réparation plastique des grandes pertes de substances pharyngées et oesophagiennes assure un succès complet y compris le rétablissement des fonctions de déglutition et de phonation sans parler des bons résultats esthétiques, on rencontrera néanmoins dans quelques cas de chirurgie plastique à grande échelle certaines difficultés qui nécessiteront de prendre des mesures spéciales

Ces difficultés peuvent provenir du fait de la taille de la forme ou du siège des pertes de substance probables et de l'état des zones environnantes (disposition en lanterne)

L'auteur fait des suggestions pour la solution de ces problèmes Il illustre enfin les bons résultats que les méthodes utilisées donnent dans des cas particulièrement difficiles

Schwierigkeiten bei der Plastischen Deckung Grosser Schlund- und Speiseröhrenlücken und ihre Beherrschung HARRY MENNIG

Obwohl die Verwendung von Rundstiellappen zur plastischen Deckung grosser Lücken des Schlundes und der Speiseröhre grösste Sicherheit für einen vollen Erfolg der Lückendeckung mit Wiederherstellung der Schluck und Sprechfunktion und kosmetisch gutem Ergebnis bietet, ergeben sich doch bei solchen Grossplastiken in einzelnen Fällen Schwierigkeiten deren Beherrschung besondere Massnahmen erfordert

Schwierigkeiten entstehen durch Umfang, Gestalt und Sitz der möglichen Lücken und die Beschaffenheit der Umgebung (Bildvorweisungen)

An einzelnen Beispielen wird dargelegt, wie diese Schwierigkeiten zu beherrschen sind.

Schliesslich werden die guten Ergebnisse bei solchem Vorgehen in ungewöhnlich schwierigen Fällen an Diapositiven dargestellt

Como Superar las Dificultades que se Presentan en la Restitucion Plastica de Grandes Defectos de la Faringe y del Esofago. HARRY MENNIG

Aunque el empleo de colgajos pediculados en la restitución plástica de grandes defectos de éste tipo asegura el éxito incluyendo la restauración de las funciones de deglutir y hablar así como un buen resultado cosmético ciertas dificultades pueden aparecer en algunos casos graves que requireen medidas especiales Estas dificultades pueden surgir dependiendo del tamaño y forma, del defecto así como de la condición de las áreas vecinas

Se hacen sugestiones para la solución de éstas dificultades y se muestran en diapositivas los resultados en casos desusadamente difíciles.

IX

BREAST AND ABDOMEN

Mammaryplasty with Free Transplantation of the Nipples and Areolae: A Thirteen Year Follow-Up Report.

WM MILTON ADAMS, M D , *Department of Plastic Surgery, University of Tennessee Medical School, Memphis, Tennessee*

Free transplantation of the nipples and areolae in one stage mammaryplasty for correction of the hypertrophied breast has been performed in 118 cases in the past thirteen years The principle of the operation and indications for the operation are the same as originally reported, however, some minor improvements and refinements have been made in the technic

The historical bibliography of various methods of breast reconstruction has been given in previous articles

This method of free transplantation of the nipples and areolae was first presented to the annual meeting of the American Society of Plastic and Reconstructive Surgery in December, 1942 The technic was generally received as a rather radical method of mammaryplasty because of fear of loss of the nipples and areolae To date there has been complete take of the nipples and areolae in every case, and it is gratifying to note that an increasing number of plastic surgeons have been using this technic from year to year

Free transplantation of the nipples and areolae for correction of the moderately large and extremely large breast has many advantages over other types of mammaryplasty These advantages are

1 The operation requires less operating time
2 There is less shock to the patient
3 The period of hospitalization is shortened
4 There is less danger of necrosis of the nipples and skin flaps
5 No vertical scar is necessary from the lower margin of the nipple down to the submammary fold
6 It is much easier to create a nicely shaped breast since the surgeon is free to make incisions in the remaining mammary tissue without fear of disturbing the circulation to the nipples, as is true in other mammaryplasty technics

The following operative technic and postoperative care is used in all cases Only a light anesthetic supplemented with local infiltration of novocaine is used Sodium pentothal is given intravenously and supplemented, if necessary, with a light nitrous oxide and oxygen mixture The amount of adrenalin used is dependent upon the total amount of novocaine necessary

Location of incisions for amputation of the breasts—It is most important that the specific technic be carried out with detail and care The location of the incisions for the partial amputation of the breasts is of utmost importance This incision on the anterior surface of the breast is made to correspond to the submammary fold, and it should be made sufficiently low to assure ample skin coverage over the dome of the breast If there is any doubt about the location for this incision, the surgeon should err on the side of making the incision too low, as it is quite simple to excise any redundant skin to allow proper closure after the reshaping of the breast The incision on the undersurface of the breast should be made at the lower margin of the submammary fold, as this skin margin pulls upward when sutured to the skin of the anterior surface of the breast To secure hemostasis plain catgut is used for ligation of the large vessels and an electric cautery for the smaller ones If the

incision on the undersurface of the breast is made along the submammary fold, rather than slightly inferior to it, the scar will be above the submammary fold and will be very conspicuous

Dissection of the nipple-areolar grafts—To reduce the operating time the amputated portions of the breasts with the nipples and areolae attached are given to the assistant surgeon for dissection and preparation of the nipple and areolae grafts while the re-shaping of the remaining portion of the breasts is being carried out To facilitate the dissection of the nipples and areolae from the mammary specimen several large tension sutures or towel clips are used to draw the skin tightly around the mammary tissue.

The size of the nipple-areolar graft depends upon the size of the patient however the average diameter is approximately 4 centimeters The areola is dissected as a free full thickness graft. Beginning at the periphery of the areola, the dissection is carried deeper as the nipple is approached so as to include some of the smooth muscle however this dissection in the central portion of the nipple graft should not exceed 4 to 5 millimeters (Fig. 344, A and B) The unused portion of the areola is also dissected free It is wrapped in vaseline gauze placed in a tightly closed sterile test tube and kept refrigerated for at least ten days, or until after a satisfactory take of the graft is apparent. Even though there has been a complete take of the nipple-areolae grafts in the 118 cases in the event of loss of the graft this preserved areola would be the most ideal substitute for the re-grafting of a new nipple. If sufficient areolar tissue is not available, the labium minora is the next best substitute, as it is very similar in texture and color to the nipple and areola. This technic has been previously reported by the author If it should be necessary to resort to the construction of a nipple with the use of areola or labial tissue several weeks following complete take of the grafts a more normal appearing nipple may be obtained by inserting a mass of scar tissue under the central portion of the graft to give more protrusion. In all types of mammaryplasty it is recommended that the unused portion of the areolae be saved and kept refrigerated until viability of the grafts is assured.

Re-shaping of the remaining breast tissue—To give the desirable shape to the remaining breast tissue the skin overlying the lower portion of the mammary gland is undermined. The desired conical shape of the breast may be obtained by one of two methods. The first method involves the conventional wedge shape excision of breast tissue. The extremely flat breast is best handled by the second method. In the second method the lower portion of the mammary tissue is divided in the midline by a through and through vertical incision, extending from the lower margin of the breast tissue upward sufficiently to mobilize the two lower halves of the breast. These mobile tissue flaps are then

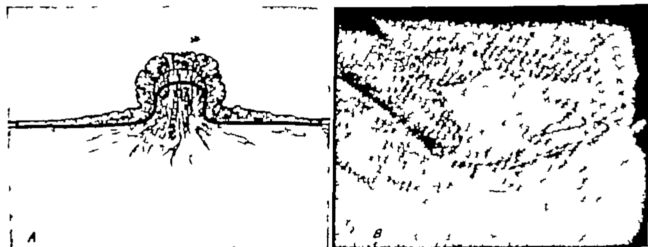


Fig. 344. A The heavy line represents an incision approximately $\frac{1}{4}$ inch from the surface this includes the maximum amount of smooth muscle which one should attempt to graft with the nipple. The fine line represents an incision at a depth of $\frac{1}{8}$ inch, which includes the minimum amount to assure a successful take of the graft. B Illustration of actual technic employed at the operating table.

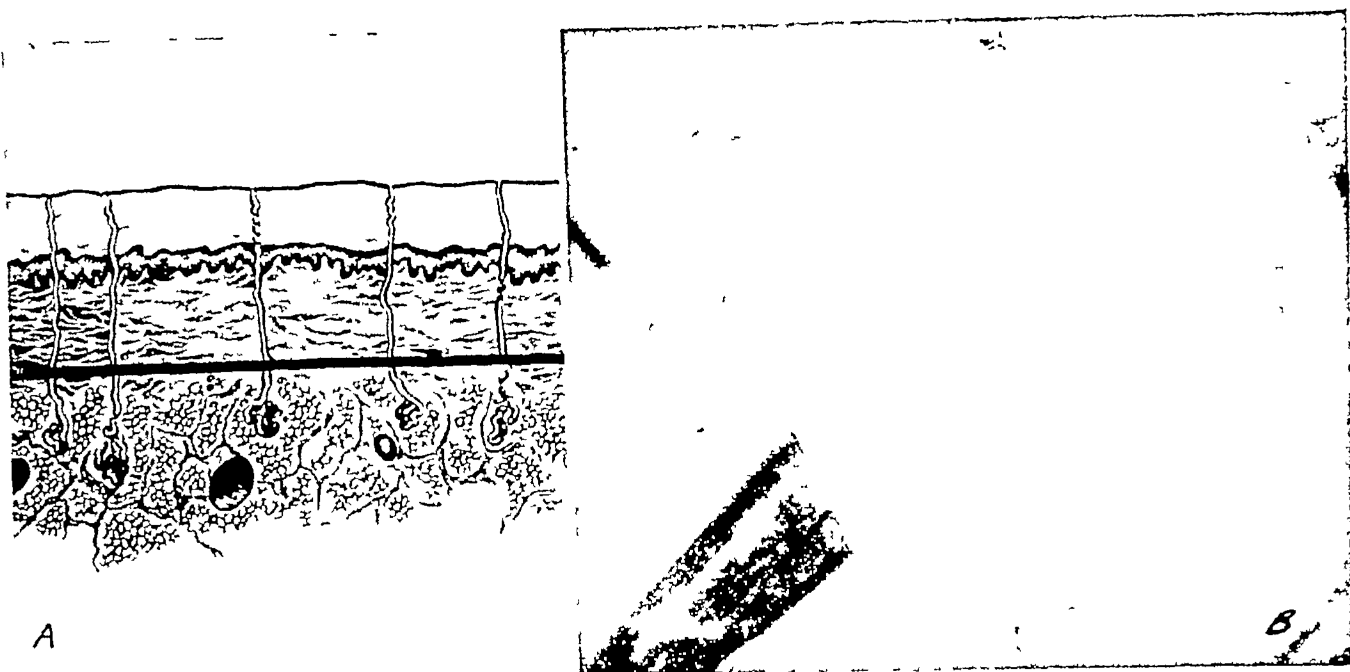


FIG 345 Preparation of recipient bed A The heavy line indicates the thickness of skin to be removed in preparing the recipient bed for the nipple-areolar graft It is very important to leave the rich capillary bed of the basal layer of the skin B Illustration of actual technic employed at the operating table

plicated, one over the other, by rotating one flap clockwise and the opposite flap counterclockwise The internal flap is held in place with one fixation suture of #3-0 chromic catgut and the external flap with two fixation sutures of #3-0 chromic catgut This plication of the two flaps determines the size of the circumference of the base of the breast and the conical shape If the breasts are still too broad after plication, an additional amount of breast tissue can be removed from either side To insure a minimal scar the skin margins are sutured together in extreme eversion with #3-0 Deknatel silk mattress sutures No catgut or buried suture material is used in the skin closure One or two rubber dam drains, approximately ½ inch in width, are inserted in the dependent portion of the breast tissue and brought out through the incisions laterally These drains extend up into the superficial part of the final dressing in order that they might be removed without disturbing the entire dressing The drains are routinely left in place for six to seven days postoperatively

Location and preparation of recipient bed for nipple transplants—To select the new location for the nipple the patient is raised to a near sitting position on the operating table No mathematical formulas are recommended for locating the new nipple sites The artistic judgment of the surgeon and that of the other operating room assistants is much more reliable There is practically never any disagreement among those present as to the exact location for the grafts

After the new nipple site is selected a near full thickness skin graft is removed with a sharp dissecting knife to create a surface with very rich capillary circulation to receive the nipple grafts Extreme care is taken not to extend the dissection through the skin into the subcutaneous and fatty tissue, as this mammary fat is a very poor recipient bed for grafts (Fig 345, A and B)

Suturing of nipple-areolar graft and dressing—The technic for suturing the nipples and areolae to their new beds has never been altered from that used in the first case 13 years ago The nipple-areolar graft is evenly distributed over the recipient site and fastened in place with four diametrically opposed sutures A continuous suture is then placed around the periphery To insure perfect contact between the graft and its bed, and to prevent slipping of the graft and oozing of blood or serum from beneath, the entire nipple and areola are quilted to the basal layer of the skin with several rows of running sutures Although I am confident that one could

incision on the undersurface of the breast is made along the submammary fold, rather than slightly inferior to it, the scar will be above the submammary fold and will be very conspicuous

Dissection of the nipple-areolar grafts—To reduce the operating time the amputated portions of the breasts with the nipples and areolae attached are given to the assistant surgeon for dissection and preparation of the nipple and areolae grafts while the re-shaping of the remaining portion of the breasts is being carried out. To facilitate the dissection of the nipples and areolae from the mammary specimen several large tension sutures or towel clips are used to draw the skin tightly around the mammary tissue

The size of the nipple-areolar graft depends upon the size of the patient however the average diameter is approximately 4 centimeters. The areola is dissected as a free full thickness graft. Beginning at the periphery of the areola, the dissection is carried deeper as the nipple is approached so as to include some of the smooth muscle, however this dissection in the central portion of the nipple graft should not exceed 4 to 5 millimeters (Fig 344, A and B) The unused portion of the areola is also dissected free It is wrapped in vaseline gauze placed in a tightly closed sterile test tube and kept refrigerated for at least ten days, or until after a satisfactory take of the graft is apparent. Even though there has been a complete take of the nipple-areolae grafts in the 118 cases in the event of loss of the graft this preserved areola would be the most ideal substitute for the regrafting of a new nipple. If sufficient areolar tissue is not available, the labium minora is the next best substitute as it is very similar in texture and color to the nipple and areola. This technic has been previously reported by the author If it should be necessary to resort to the construction of a nipple with the use of areola or labial tissue several weeks following complete take of the grafts a more normal appearing nipple may be obtained by inserting a mass of scar tissue under the central portion of the graft to give more protrusion. In all types of mammaryplasty it is recommended that the unused portion of the areolae be saved and kept refrigerated until viability of the grafts is assured.

Re-shaping of the remaining breast tissue—To give the desirable shape to the remaining breast tissue the skin overlying the lower portion of the mammary gland is undermined. The desired conical shape of the breast may be obtained by one of two methods. The first method involves the conventional wedge shape excision of breast tissue. The extremely flat breast is best handled by the second method. In the second method the lower portion of the mammary tissue is divided in the midline by a through and through vertical incision, extending from the lower margin of the breast tissue upward sufficiently to mobilize the two lower halves of the breast. These mobile tissue flaps are then

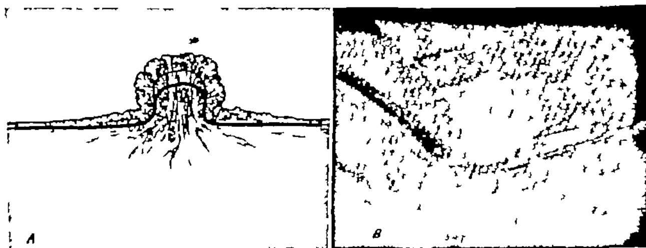


FIG 344. A. The heavy line represents an incision approximately ¼ inch from the surface this includes the maximum amount of smooth muscle which one should attempt to graft with the nipple. The fine line represents an incision at a depth of ⅛ inch, which includes the minimum amount to assure a successful take of the graft. B Illustration of actual technic employed at the operating table.

The nipple grafts may be inspected at any-time by cutting a semicircular incision with a razor blade through the dressing over the nipple sites without disturbing the remaining portion of the dressing The sutures in the submammary fold wounds are left in as long as possible without producing stitch scars Following removal of the sutures the incisions are carefully supported with adhesive tape for several weeks Patients are fitted with a form fitting brassiere and instructed to wear it night and day for six weeks (Figs 347, 348 and 349)

The patients who have become pregnant following free transplantation of the nipples have encountered no difficulty There is a gradual increase in the size of the breasts up to the time of delivery, but two weeks post partum the breasts return to their normal size and shape For ten to fourteen days following delivery these patients are given 2 milligrams of stilbesterol daily If there is undue fullness of the breasts this dosage is increased to 5 milligrams daily An elastic bandage is also worn over the breasts for approximately two weeks

To date there has been no reported development of cyst or tumor masses in any of the 118 cases

This technic of free transplantation of the nipples and areolae is not recommended for correction of the slightly enlarged and pendulous breasts, but as the procedure of choice in the cases of moderately large and extremely large mammary glands During the past thirteen years I have employed this technic in approximately seventy-five per cent of the total cases of mammaryplasties performed for reduction and re-shaping of the breasts

Discussion

Dr Karl-Johan Grenabo, Stockholm, Sweden

During the years 1948-1954 at my clinic at St Gorans Hospital in Stockholm we have operated on 427 patients with hypertrophic breasts and among these there have been done subtotal amputation with free transplantation of the nipples in 55 cases The incision in the submammary region is placed about 1 cm above the fold The reshaping of the breasts and the preparation of the nipple grafts are done in the same way as just described by Dr Adams In the new nipple bed we just leave the deepest dermis layer in order to get a perfect nourishment to the graft Only in the two first cases, operated on in 1948, we excised the whole thickness of the skin and in one we lost most of the grafted nipples I have made a follow-up and have seen 40 cases In 39 cases the take of the nipple grafts has been perfect The youngest patient was 37 years old and the oldest 69—an average of 48½ years The top-weight of the resected material from both breasts was 3605 gms, with an average of 1500 gms I have tested the sensitivity of the grafted nipples and among these 80 nipples the sensitivity was totally lost in one, in 35 nipples the sensitivity was less than in the skin over the breast, in 25 nipples the same, and in 16 nipples better than in the skin over the breast

Thirty-eight patients came to operation because of heaviness of the breasts and 13 of them also had trouble with eczema in the submammary fold specially in summertime, 5 also had backache and were sent over from an orthopedic clinic and 5 also had fibroadenoma with pain and came from the gynecological department, all were free for these symptoms on the follow-up All patients say they feel wonderful after the operation and wish they had been operated on earlier

Plastikkir avd, St Görans Sjukhus, Stockholm, Sweden

Plastie Mammaire avec Greffe Libre des Mamelons et des Aréoles W Milton Adams

La greffe libre est indiquée dans les cas de très gros sein Elle a l'avantage de ne nécessiter qu'un temps opératoire avec habituellement une hospitalisation de quelques jours

Après amputation subtotale du sein, le chirurgien peut donner au tissue mammaire restant le dessin, la taille et la forme qu'il désire, sans faire courir aucun danger de gêne circulatoire au mammelon au lambeau cutané de recouvrement ou encore au tissu mammaire comme cela est le cas dans d'autres types de plastie mammaire

Il est important dans la préparation du lit récepteur des mamelons qu'une greffe de peau presque totale puisse être prélevée et que le tissu et la graisse sous-cutanés ne soient pas mis à nu

Il est également important de pratiquer les incisions sous-mammaires, nettement en-dessous du replis sous-mammaire de façon à ce que la cicatrice postopératoire occupe la ligne sous-mammaire normale

Dans les 118 cas opérés au cours des quinze dernières années il y a eu toujours une prise complète du mammelon en greffe libre

expect a good take of the nipple and areola without suturing and quilting them to this extent I do not feel justified in altering the technic since all of the grafts have taken satisfactorily (Fig 346 A B C and D)

The dressing of the nipples and breasts is likewise carried out specifically as originally reported. The dressing consists of one layer of rayon or vaseline gauze, a layer of dry gauze about ½ inch in thickness and a layer of soft rubber sponge. The central portion of the rubber sponge is saucerized to prevent undue pressure upon the nipple portion of the graft An other thin layer of gauze is laid over the rubber sponge and this part of the dressing is held in place with elastic adhesive. Layers of fluffy gauze are then applied over the entire breast and secured by an ace bandage around the chest. Part of the dressing is carried over the shoulders to provide an uplifting support.

The patients have very little pain or discomfort postoperatively In the routine case only one or two hypodermics or opiates are necessary An allergy history is obtained from the patient and antibiotic medication is then prescribed for the first five to seven days. Ice caps are kept over the dressings for approximately five to six days to reduce perspiration under the dressing and to add to the comfort of the patient It is also my opinion that this chilling aids in an early and healthy take of the grafts.



Fig. 346. A B and C Illustration of the technic employed to suture the nipple-areolar graft to the recipient bed The first step is to introduce four retention sutures (as illustrated in A) to insure an even distribution of the graft A simple continuous suture is placed around the periphery the central portion is quilted to the recipient area by running sutures D Window cut in first postoperative dressing on the tenth day to illustrate how the nipple grafts are dressed from the skin out. (1) Layer of vaseline gauze or rayon. (2) About ½ inch thickness of plain gauze (3) Layer of rubber sponge ½ thickness. The central portion of the rubber sponge was "saucerized" to prevent undue pressure on the elevated area (4) Thin layer of dry gauze (5) Elastic adhesive

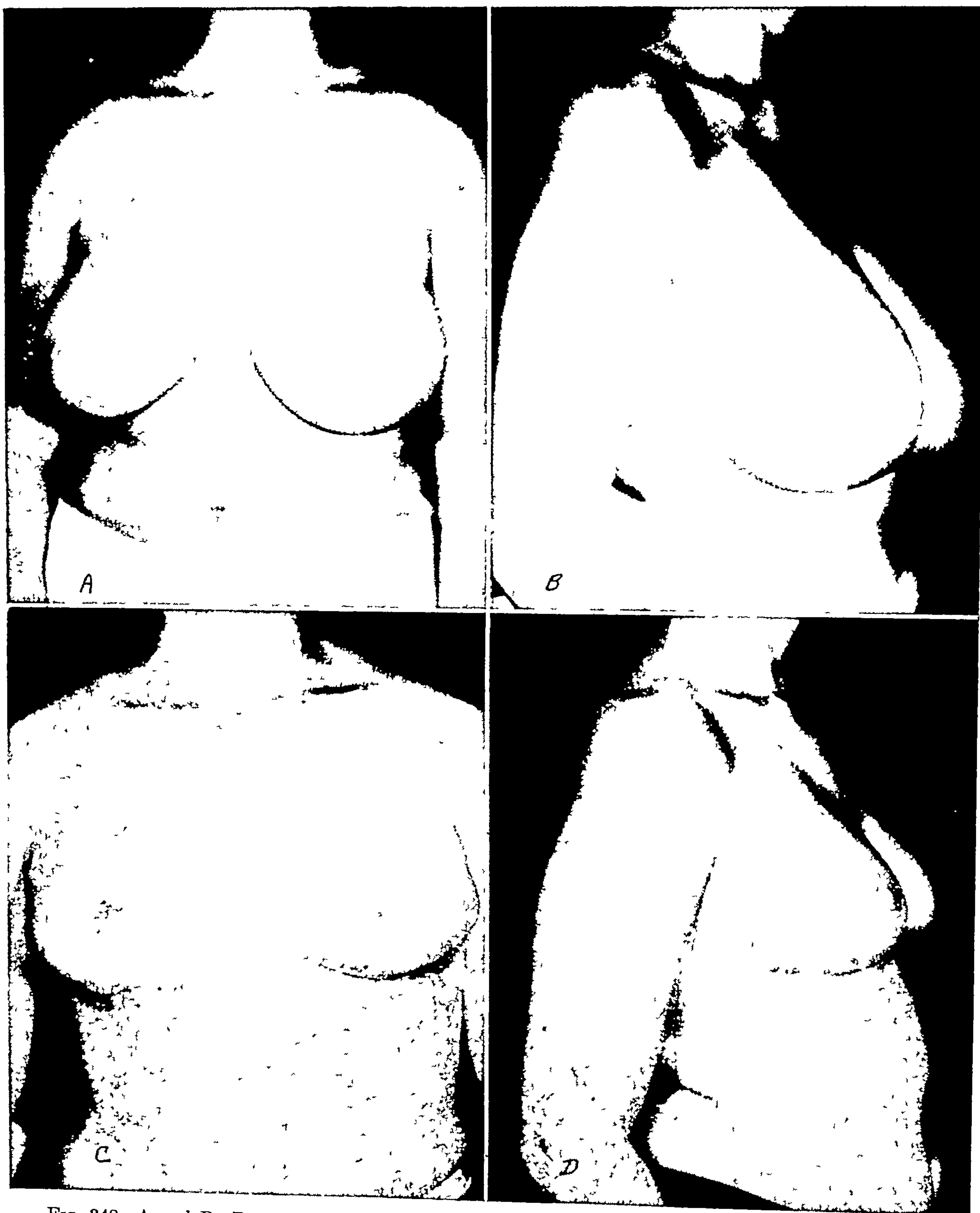


Fig 348 A and B Preoperative photographs of a 25-year-old woman with hypertrophy of breasts C and D Postoperative photographs of same patient 3 weeks following one stage mammaryplasty with free transplantation of nipples

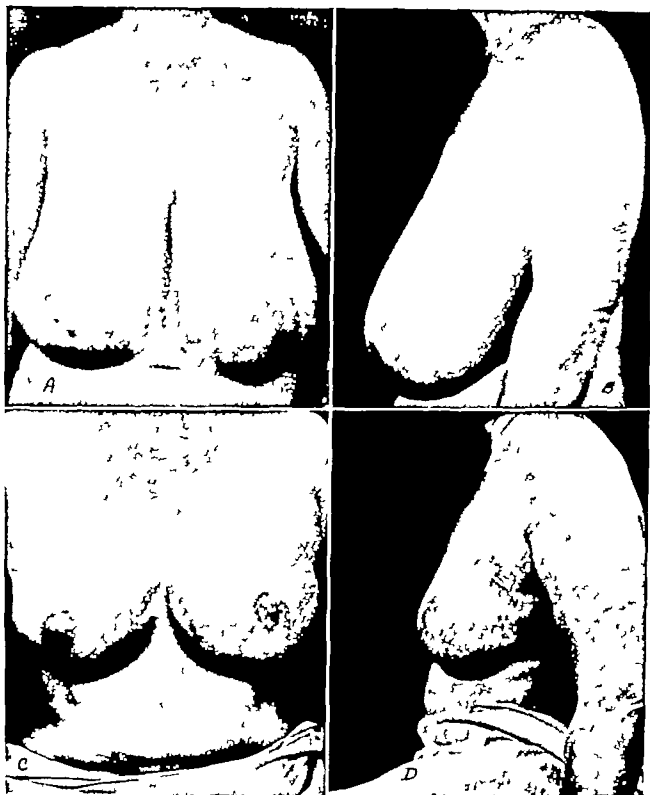


FIG 347 A and B Preoperative photographs of a 45-year-old woman with extreme hypertrophy of breasts. C and D Postoperative photographs of same patient 5 years following one stage mammaryplasty with free transplantation of nipples.

Further Experience of Preservation of Lactation Capacity and Nipple Sensitivity in Breast Reduction. A RAGNELL, M D, *Associate Professor of Plastic Surgery, Karolinska Institute, Stockholm, Sweden*

In mammaplasty the operator should not only seek to obtain a good esthetic result with the minimum operative risk, even where a substantial reduction in size is required, he must also endeavor to preserve the lactation capacity—which may be required later—and if possible, the sensibility of the nipples too

Between 1936 and 1941 the writer treated 86 cases of breast hypertrophy by Biesenberger's single pedicle method, which is based on earlier investigations by Kaufmann (1933) into the blood supply of the breasts, and involves resection of the lateral half of the gland, including the long thoracic artery Biesenberger's method was, at all events in my hands, far too often followed by circulatory disturbances associated with nipple cyanosis and secondary necrosis, which in some cases involved even the nipples and areolae In shape the breasts often showed, later on, heaviness of the under part and upturned nipples

The writer therefore took up, beginning in 1941, his two-pedicle method that was described in a monograph published as a supplement of Acta Chir Scand, 1946 The resection technique was based on later findings regarding the anatomy of the breast—notably those of Marcus (1934) and Salmon (1938-40)—and consisted in removal of a sector-shaped piece from the superior central portion of the gland and, in suitable cases, a corresponding piece from the lower part in the middle line, leaving both the internal mammary system and the vessel-bearing pedicle to the axilla intact This method gave satisfactory reduction with a single stage procedure in four-fifths of the cases, only one-fifth required two-stage operations (See Figs 350-354)

When copious surface fat was present, the resections in both the first and second stages included removal of fat from the lower part of the breast The two-stage procedure was used only for excessively hypertrophied breasts, particularly in older patients, where distinct signs of stasis were present, and where pronounced ptosis combined with a narrow pedicle gave the breast a pear-shaped form, for experience had shown the operation to be associated with some risks in these cases In shaping of the breast, care was taken to raise a sufficient amount of tissue to the upper part in order to obviate the secondary descent to the lower portion For fixation to the thoracic wall, only catgut sutures were used On the basis of esthetic appraisal in each individual case the nipples were placed at distances of 18-21 cm from the upper end of the sternum

The reduction operation with free grafting of the nipples which Dartigues and Thorek described and Adams later recommended was reserved for cases in which pregnancy was out of the question, in which earlier pregnancy had not produced lactation, and for the extremely rare cases with breasts of such gigantic proportions as to rule out ordinary mammaplasty In the 77 cases in which we employed this method we found it to be reliable insofar as healing of

TABLE I SENSIBILITY OF NIPPLES

In the entire series of 333 breasts the nipple sensibility was unchanged after operation in 270 cases (31 1 per cent), including

219 first stage (mean weight of resected tissue 270 gm)

51 second stage (mean weight of resected tissue 674 gm)

Temporarily disturbed in 36 (10.8 per cent), including

19 after first stage (mean weight of resected tissue 289 gm)

13 after second stage (mean weight of resected tissue 527 gm)

4 after both stages (mean weight of resected tissue 158 gm)

Permanently impaired in 20 (6 0 per cent), including

15 after first stage (mean weight of resected tissue 205 gm)

5 after second stage (mean weight of resected tissue 543 gm)

Permanently abolished in 7 (2 1 per cent), including

4 after first stage (mean weight of resected tissue 339 gm)

3 after second stage (mean weight of resected tissue 412 gm)

The mean weight of resected tissue excludes 23 cases where the weight was not given in the records

Data were available in 171 of 181 cases of breast hypertrophy They were based on the case records in 115 cases and on a questionnaire in 56

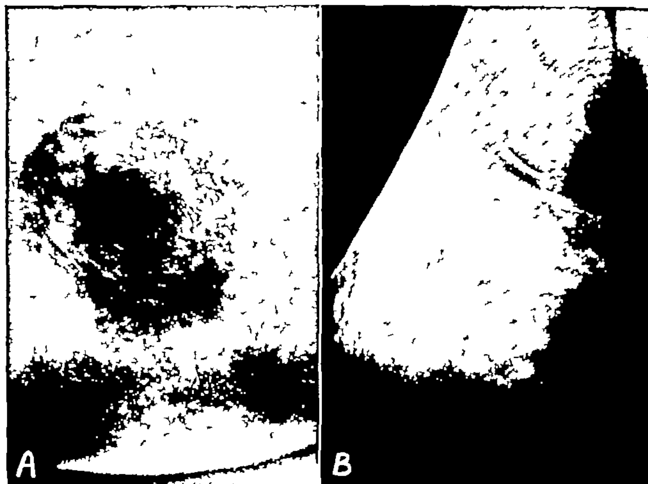


Fig 349 A and B Close-up photographs of nipple-areolar grafts in patient shown in Figure 34, 5 years following one stage mammaryplasty with free transplantation of nipples.

Mammaplastik mit freier Transplantation der Brustwarze und des Warzenhofes. W Milton Adams.

Für die extrem vergrösserte Brust wird die freie Transplantation der Brustwarze empfohlen. Der Vorteil dieser Methode ist, dass es ein einzeitige Operation ist die gewöhnlich nur wenige Tage Krankenhausaufenthalt erfordert

Nach subtotaler Brustamputation steht es dem Chirurgen frei dem restlichen Brustgewebe jede beliebige Form und Grösse zu geben, ohne dass dabei die Gefahr einer Durchblutungsstörung der Brustwarze der bedeckenden Hautlappen oder des Brustgewebes besteht wie es bei anderen Methoden der Mammaplastik sonst der Fall ist

Bei der Vorbereitung der Transplantation der Brustwarze ist es wichtig dass ein Hauttransplantat von fast voller Dicke entnommen und dass das Subkutan- und Fettgewebe nicht freigelegt wird.

Es ist ebenfalls wichtig, die submammillären Incisionen gut unterhalb der Submammillarfalte zu legen, so dass die postoperative Narbe in der normalen Submammillarlinie zu liegen kommt

In allen während der letzten 15 Jahre auf diese Weise operierten 118 Fällen ist ein vollständiges Anheilen der freitransplantierten Brustwarze erfolgt.

Plastia Mamaria con Transplante Libre de Pezon y Areola. W Milton Adams.

Se recomienda el trasplante libre para los casos de tamaño extremoso de la mama. La ventaja de esto es que requiere un solo estadio operatório y unos cuantos días de hospitalización.

Después de la amputación subtotal de la mama, el cirujano Puede hacer lo que desee con el resto del tejido mamario en cuanto a forma o tamaño sin peligro de trastorno circulatório para los pezones pudiendo colocarlos sobre los colgajos de piel o tejido mamario como sucede en otros tipos de mastoplastía

Es importante en la preparación del lecho receptor para el pezon retirar casi todo el espesor de la piel, pero sin que queden expuestos los tejidos o grasa subcutáneos.

Tambien es importante hacer las incisiones submamarias bien abajo del pliegue submamario para que la cicatriz postoperatória pueda quedar en la linea submamaria normal

El autor a visto la completa integración de los pezones trasplantados en los 118 casos que ha tenido en los ultimos 15 años.

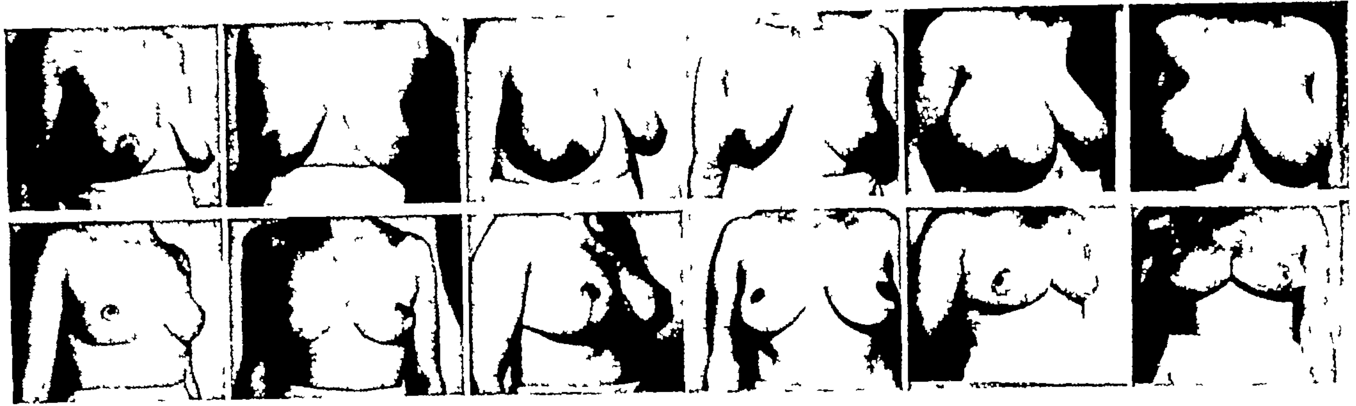


Fig 354 (left) Atrophic breasts with ptosis before and after operation in one stage without resection (Center) Hypertrophic breasts with ptosis before and after operation in one stage with resection (Right) Hypertrophic breasts with ptosis before and after operation in two stages with massive resection (3 188 grams)

the nipples was concerned, but less satisfactory as to the esthetic end result

With our accumulated experience of more than 1,000 cases treated by the method described here, we have great faith in it In the writer's personal series, in which 359 patients with breast hypertrophy have undergone resection, there has been no necrosis of either nipples or areolae in the last ten years In 1944 there was a single case of unilateral nipple necrosis in a 38-year-old woman, with breasts of two-stage type, whom I treated in one stage This was a case of faulty application of a method still under trial, and as such it scarcely reflects on the method itself

The biological importance of human milk has become increasingly appreciated as research into immunity and vitamins has progressed It is now generally agreed that breast feeding is superior to all other methods of feeding infants and is also a source of happiness and satisfaction to the mother

It is therefore desirable to employ whenever possible an operative procedure involving transplantation of the nipples attached to pedicles of functional secreting tissue More fat and less glandular tissue are found in the superior central portion The resection should be made sectoral in shape on account of the radial formation of the milk lobes in the gland itself, and, if possible, should follow natural septa in the latter In the central parts it must be subtotal, so as to avoid injuring the milk ducts from the retained glandular lobes, whereas in the outer parts it may readily be total, since the peripheral glandular tissue has in any case been robbed of its duct system

As will be seen from the follow-up below, the lactation capacity of unoperated hypertrophic breasts has been considerably underrated Out of a total of 445 patients with hypertrophic breasts in the author's series, 105 had been pregnant prior to operation Of these, 60 (57 1 per cent) had suckled satisfactorily (6 months or more), 40 (38 1 per cent) unsatisfactorily, and only 5 (4 8 per cent) not at all The postoperative examination of the 359 cases (in 14, no data were available), in which a transposition of the nipples had been performed by a conservative method from the functional point of view, revealed that 27 patients had become pregnant since operation Of these, 16 (59 8 per cent) had suckled satisfactorily, 9 (33 3 per cent) unsatisfactorily and 2 (6 9 per cent) not at all In this series, therefore, those women who underwent operations in which the type of resection proposed by the author was used, had the same suckling capacity after the operation as that which seems to be present in unoperated cases

Fig 352 (A-E, top right) *Author's two-stage method* Stage 1 a) Skin incisions marked b) Skin retracted, sector-shaped resection from the gland c) Reconstruction of the gland d) Skin-covering preparatory to reduction of the lower skin-flap e) Final skin suture

Fig 353 (A-G, bottom right) *Author's two-stage method* Stage 2 a) Skin incisions marked b) Upper skin-flap retracted c) Upper and lower skin-flaps retracted Crescent-shaped resection of the gland d) Sector-shaped resection of the gland, two of the sutures inserted e) Reconstruction of the gland f) Skin-covering replaced, resection from the lower skin-flap g) Final skin suture



FIG 350 (A E, top left) *Author's one-stage method* (for loose flaccid breasts without enlargement or with moderate hypertrophy) a) Skin incisions marked. b) Peri-areolar skin removed temporary fixation sutures inserted. c) Skin retracted the gland prior to reduction d) Sector-shaped resections from the gland fixation sutures with a lifting action inserted $S_1S_2S_3$. e) Reconstruction of the gland

FIG 351 (A D bottom left) *Author's one-stage method* (skin plastic) a) Skin-covering replaced preparatory to shaping and reduction. b) Skin-covering reduced and sutured. c) Detail of suturing d) Final skin suture.

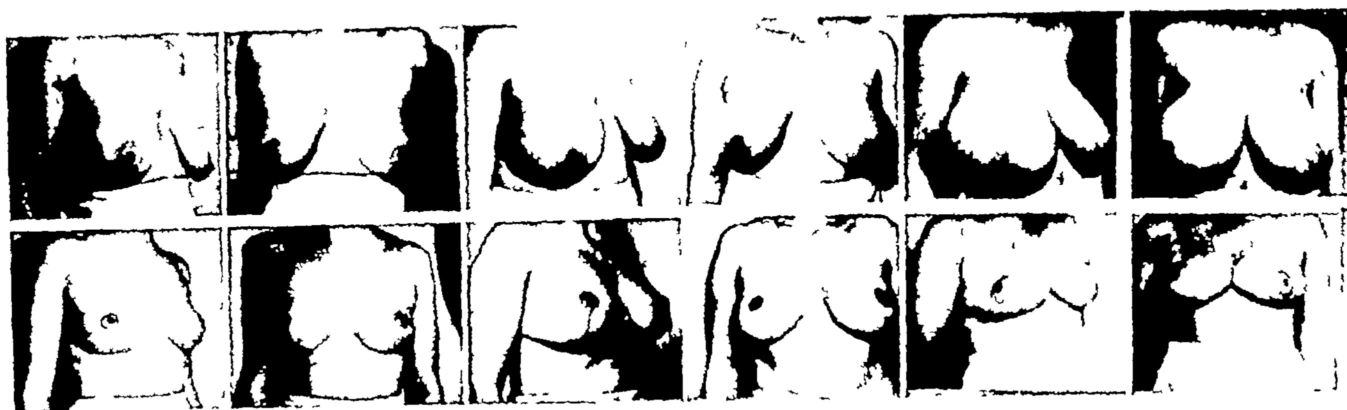


Fig 354 (left) Atrophic breasts with ptosis before and after operation in one stage without resection (Center) Hypertrophic breasts with ptosis before and after operation in one stage with resection (Right) Hypertrophic breasts with ptosis before and after operation in two stages with massive resection (3 188 grams)

the nipples was concerned, but less satisfactory as to the esthetic end result

With our accumulated experience of more than 1,000 cases treated by the method described here, we have great faith in it In the writer's personal series, in which 359 patients with breast hypertrophy have undergone resection, there has been no necrosis of either nipples or areolae in the last ten years In 1944 there was a single case of unilateral nipple necrosis in a 38-year-old woman, with breasts of two-stage type, whom I treated in one stage This was a case of faulty application of a method still under trial, and as such it scarcely reflects on the method itself

The biological importance of human milk has become increasingly appreciated as research into immunity and vitamins has progressed It is now generally agreed that breast feeding is superior to all other methods of feeding infants and is also a source of happiness and satisfaction to the mother

It is therefore desirable to employ whenever possible an operative procedure involving transplantation of the nipples attached to pedicles of functional secreting tissue More fat and less glandular tissue are found in the superior central portion The resection should be made sectoral in shape on account of the radial formation of the milk lobes in the gland itself, and, if possible, should follow natural septa in the latter In the central parts it must be subtotal, so as to avoid injuring the milk ducts from the retained glandular lobes, whereas in the outer parts it may readily be total, since the peripheral glandular tissue has in any case been robbed of its duct system

As will be seen from the follow-up below, the lactation capacity of unoperated hypertrophic breasts has been considerably underrated Out of a total of 445 patients with hypertrophic breasts in the author's series, 105 had been pregnant prior to operation Of these, 60 (57 1 per cent) had suckled satisfactorily (6 months or more), 40 (38 1 per cent) unsatisfactorily, and only 5 (4 8 per cent) not at all The postoperative examination of the 359 cases (in 14, no data were available), in which a transposition of the nipples had been performed by a conservative method from the functional point of view, revealed that 27 patients had become pregnant since operation Of these, 16 (59 8 per cent) had suckled satisfactorily, 9 (33 3 per cent) unsatisfactorily and 2 (6 9 per cent) not at all In this series, therefore, those women who underwent operations in which the type of resection proposed by the author was used, had the same suckling capacity after the operation as that which seems to be present in unoperated cases

Fig 352 (A-E, top right) *Author's two-stage method* Stage 1 a) Skin incisions marked b) Skin retracted, sector-shaped resection from the gland c) Reconstruction of the gland d) Skin-covering preparatory to reduction of the lower skin-flap e) Final skin suture

Fig 353 (A-G, bottom right) *Author's two-stage method* Stage 2 a) Skin incisions marked b) Upper skin-flap retracted c) Upper and lower skin-flaps retracted Crescent-shaped resection of the gland d) Sector-shaped resection of the gland, two of the sutures inserted e) Reconstruction of the gland f) Skin-covering replaced, resection from the lower skin-flap g) Final skin suture

of mammary hypertrophy Less than 10 per cent were unable to feed their babies at all

Chronic conditions of stasis in other organs produce fibrinoid induration and degenerative changes in the parenchyma There is every reason to assume that the same is true of hyper trophic and flaccid breasts and hence an im proved circulation following mammaplasty at an early age should compensate the attendant reduction of the mammary tissue

The post-operative preservation of nipple sensibility is largely of psychological significance In the author's series the effect on the sensibility was studied in 333 hypertrophic breasts oper ated on between 1946 and 1952. In 81 1 per cent the sensibility was quite unaffected by the mammaplasty in 10.8 per cent it was tem porarily disturbed in 6.0 per cent reduced and in only 2 1 per cent was it totally lost.

An analysis of the table shows that disturbances of sensibility followed 14.1 per cent of all first-stage operations and 25.8 per cent of the second-stage operations i.e., they were almost *doubled after operations of second stage type* which invariably included freeing the breast from the thoracic wall from below and suturing in an elevated position.

A study of the different types of resection with respect to their influence on disturbances of nipple sensibility showed that in first-stage oper ations a sector-shaped resection from the lower portion had been made in 22 per cent of those that were followed by such disturbances but in only 13.2 per cent of those that were not In second-stage operations the corresponding fig ures were 79 per cent and 47 per cent respec tively The incidence of disturbed sensibility was accordingly almost doubled following resections from the lower part of the breasts, whether done at the first or second stage This should lead to some restraint in the case of these resections although they cannot alone be held responsible for the complication

The mean weights of resected tissue that are shown in the table—about 300 gm for one-stage and 500 gm for two-stage procedures—do not suggest that the incidence of disturbed sensibility was correlated to *the magnitude of the resection*. This is confirmed by a comparative tabulation of non hypertrophic pendulous breasts where no resection was done but only incision in the middle line above the nipple undermining of the pedicles and suspension of the breasts with the pedicles overlapping In this series—44 breasts—the nipple sensibility was unchanged after operation in 34 cases temporarily impaired in five, permanently impaired in four and permanently lost in one case. Disturbances of sensibility thus occurred in ten of 44 breasts (23 per cent) i.e., far more often than in ordinary first stages with resection (14 per cent) Everything suggests that it is the actual dissection of the pedicles from the thoracic wall that damages the nerves—which finding is consistent with the anatomical observation that the nipples are chiefly innervated by medial and lateral perforating branches from the intercostal nerves.

Temporary disturbances of sensibility (10.8 per cent) sometimes subsided within three months usually 6-12 months but in occasional cases it took two years or so for sensibility to return completely

SUMMARY

Of a total series of more than 1,000 patients on whom the author and his earlier and present assistants operated by the two-pedicle method reported in 1946 the 359 cases of breast hyper trophy were selected which the author had personally examined and treated since 1941 Four-fifths of these patients had undergone one-stage operations and one-fifth two-stage opera tions.

The operation including resection and shaping of the gland, did not seem to reduce the lactation capacity in those who subsequently bore more children.

In a corresponding series of 333 hypertrophic breasts operated on between 1946 and 1952 the effect on the sensibility of the nipples was studied. In 81.1 per cent the sensibility was quite unaffected by the mammaplasty in 10.8 per cent it was temporarily disturbed in 6.0 per cent reduced and in only 2.1 per cent was it totally lost. The influence of the different phases of mammary gland resection was analysed

The investigation showed that some circumspection is required in the case of resection from the lower part of the breast, and especially in dissection of the gland from the thoracic wall during the shaping procedure

DISCUSSION

Dr Miklos Erczy, Budapest, Hungary When we speak of the importance of the breast gland as a vital organ of the female body, we mean above all of the function which makes nursing possible In characterizing nursing as the most important task of the mother, we have already determined attitude to the question of the requirements of the breast plastic This attitude may be summed up as follows that the breast plastic of a young woman should only be executed in such a way that postoperatively the nursing capacity of the breast remains intact

In order to re-establish normally by means of an operation the deformed breast gland, the ideal-aesthetic breast form is vital The ideal form of a breast is that of a virgin with normal constitution and well developed bodily shape, whose measurements correspond to those of classic statues and pictures Above and below a straight line drawn through the mamilla, i e, the breast pocket, the breast is uniformly convex and firm The external limit of the breast gland is situated in the straight continuation of the anterior axillary line

Several authors recommend a one-stage operation, but they admit that in several cases they had to make subsequent corrections

From the experience of numerous procedures and of my own experience, dating back more than 30 years, I have formed the opinion that it is impossible to make a breast plastic which fulfills the above requirements, in one operation This has caused me to develop my two-stage procedure with double wedge excision and submuscular fixation, the most important point of which is the suspension of the gland The gland is sutured beneath to the exposed pectoralis major, producing a firm adhesion, and relapse is thus prevented The important point of my method is that it prevents in an absolutely sure way the danger of necrosis At the same time the almost ideally aesthetic form and the functional capacity of the breast gland for lactation are definitely safeguarded

My method may be used for any deformity of the breast

Szent Tstván krt 4,
Budapest, Hungary

REFERENCES

1 Adams, W M Free transplantation of the nipples and areolae Surg, 15 186, 1944
2 Biesenberger, H Deformitaten und kosmetische Operationen der weiblichen Brust Verlag W Maudrich, Wien 1931
3 Biesenberger, H Einseitige Korrektur bei Asymmetrie der Brust Wièn Med Wchnschr, 82 732, 1932
4 Biesenberger, H Weitere Erfahrungen auf dem Gebiete der operativen Brustkorrektur Wien Med Wchnschr, 82 734, 1932
5 Biesenberger, H Blutversorgung und zirkulare Umschneidung des Warzenhofes Zentralbl f Chir, 62 1218, 1935
6 Dartigues, M Les anomalies du sein en dehors des hypertrophies et des prolapsus Bull et mém Soc méd de Paris, 139 575, 1935
7 Dartigues, M Traitement chirurgical du prolapsus mammaire Arch francobelges de chir, 28 313, 1925
8 Kaufmann, R Artères de la glande mammaire chez la femme Ann d'Anatomie Pathologique, 10 925, 1933
9 Kaufmann, R A propos de la chirurgie esthétique mammaire Bull et mém Soc méd de Paris, 139 484, 1935
10 Marcus, G H Untersuchungen uber die arterielle Blutversorgung der Mamilla Arch f Klin Chir, 179 361, 1934.
11 Ragnell, A Operative correction of hypertrophy and ptosis of the female breast Acta Chir Scand, 94 113, 1946
12 Ragnell, A Breast reduction and lactation Brit Journ of Plast Surg, 1 2, 1948
13 Salmon, M Les artères de la glande mammaire Ann d'Anatomie Pathologique, 16 477, 1939
14 Thorek, M Plastic reconstruction of the female breasts and abdomen Am J Surg, 43 268, 1939
15 Thorek, M Plastic surgery of the breast and abdominal wall Charles C Thomas, Springfield, Ill, 1942

Nouvelles Experiences Relatives a la Conservation de la Capacité de Lactation et de la Sensibilité du Mammelon dans la Reduction de Volume des Seins. A RAGNELL

Dans une série de plus de 1000 cas opérés tant par l'auteur que par ses assistants anciens et actuels à l'aide de la méthode à deux pédicules décrite en 1946, on a choisi les 359 cas d'hypertrophie mammaire opérés par l'auteur depuis 1941 Les 4/5e de ces málades avaient été opérées en un temps et les autres en deux temps

L'opération, résection et façonnage de la glande compris, ne semble pas avoir récuit la capacité de lactation chez celles qui par la suite ont eu des enfants

On a étudié la sensibilité du mammelon dans une série de 333 cas d'hypertrophie mammaire opérés

de 1946 à 1952. La plastie mammaire n a pratiquement pas influé sur la sensibilité mammelonnaire dans 81 1% des cas cette sensibilité a été troublée temporairement dans 10.8% des cas et diminuée dans 6% des cas elle n a complètement disparu que dans 2.1% des cas. On a donc analysé l'influence des différents temps de la résection de la glande mammaire.

Cette enquête a fait ressortir qu'il est bon d'être quelque peu circonspect dans les cas de résection de la partie basse des seins et en particulier quand on dissèque la glande pour la décoller de la paroi thoracique au cours du temps de façonnage

Weitere Erfahrungen bei der Erhaltung der Stillfähigkeit und der Brustwarzensensibilität bei Brustverkleinerung A RAGNELL.

Aus der Reihe von mehr als 1000 Patienten an denen der Verfasser und seine früheren und augenblicklichen Assistenten nach der Zweistiel-Methode 1946 berichtet, operiert haben, wurden die 359 Fälle von Brusthypertrophie ausgewählt, die der Verfasser seit 1941 persönlich untersucht und behandelt hat Vier Fünftel dieser Patienten wurden einer einphasigen und ein Fünftel einer zweiphasigen Operation unterzogen

Die Operation einschliesslich Resektion und Formung der Drüse schien die Stillfähigkeit der Patientinnen, die später Kinder hatten, nicht herabzumindern.

In einer entsprechenden Serie von 333 hypertrophischen Brüsten die zwischen 1946 und 1952 operiert wurden, wurde die Wirkung auf die Sensibilität der Brustwarze untersucht. In 81.1% war die Sensibilität durch die Mammaplastik gänzlich unbeeinflusst in 10 8% vorübergehend gestört, in 6% vermindert und in nur 2.1% völlig aufgehoben. Der Einfluss der verschiedenen Phasen der Brustdrüsenresektion wurde analysiert.

Die Untersuchungen zeigten, dass einige Umsicht bei der Resektion des unteren Teiles der Brust erforderlich ist, besonders bei dem Abpräparieren der Drüse von der Brustwand während der Formgebung.

Experiencia de la Capacidad de Lactancia y Sensibilidad del Pezon en la Reduccion de Seno. A. RAGNELL.

De un total de más de mil pacientes a quien el autor y su último ayudante han operado por el método bi-pediculado reportado en 1946 los 359 casos de hipertrofia mamaria fueron seleccionados por el autor y examinados personalmente y tratados desde 1941 Cuatro quintas partes de éstos pacientes fueron operados en un solo tiempo y una quinta parte en dos tiempos.

La operacion, incluyendo resección y formación de la glándula, parece no haber reducido la capacidad de lactancia in aquellas que tuvieron hijos posteriormente

En una serie de 333 operaciones de hipertrofia mamaria entre 1946 y 1952, se estudió la sensibilidad del pezón En el 81.1% de los casos no se afectó la sensibilidad por la mastopexia en el 10.8% se perturbó temporalmente en el 6.0% fué reducida y en el 2 1% se perdió totalmente Se analizó la influencia de las diferentes fases de la resección de la glándula mamaria.

La investigación demuestra que es necesario ser prudente en casos de resección de la parte baja del pecho y especialmente en la dirección de la glándula de la pared torácica durante el procedimiento de modelado

---

Orthostructive Surgery of Hypertrophic and Ptotic Mammary Glands Hindering Normal Activity M COELST Dr, *68 Av E Duray, Bruxelles, Belgium*

About thirty years ago mammary reconstructive surgery was in its infancy

It was looked on with suspicion as being a purely freakish, if not a foolish, act. Several very different techniques followed one another each one having its defects and its qualities. However today the atmosphere has changed since it was realized that there are cases of hypertrophy and mammary ptosis of such a serious nature as to interfere with the normal work of women When considered from this point of view the surgical treatment of cases of gross hypertrophy and mammary ptosis is an element of social significance. This is so true that in our country the surgical reduction of mammary glands affected by hypertrophy and ptosis of that gravity is classified among the operations approved by the Social Insurance organizations.

I thank the organizing Committee for the honour it has done me by calling upon me to speak today for that will enable me to describe to you a technique which I have perfected over a long period of time, and the best thing about which is that it can be employed indiscriminately in the two types of hypertrophy and ptosis This technique preserves the integrity of glandular physiology on the one hand—at the same time guarding post-operative care from necrosis and from all other post operative complications—and on the other hand it guarantees the constitution of a normal form corresponding to artistic anatomy

Here is a summary of the various operative steps.

First stage cutaneous

1 Circular perimammillary incision

2 Marking On a more or less vertical line starting from the upper edge of the centre of the clavicle and passing through the nipple, one locates on the skin the future position of the new nipple, 19 or 20 centimeters from the clavicle

3 Second guide mark 6 centimeters below the new nipple point

4 Incisions (a) horizontal incision passing through the second guide mark without however cutting into the nipple which might, in certain cases, be in the way, (b) incision along the line of the submammary groove rejoining the extremities of the previous incision

5 Excision of the cutaneous zone lying between these two incisions

6 Vertical incision rejoining the first guide mark

Second stage glandular (Fig 355)

1 Complete exposure of the gland

2 Fusiform excision with major horizontal axis and minor vertical axis, corresponding to the degree of ptosis to be corrected, in the submammillary glandular zone

3 Joining of the free lower lip of the breach thus made, to the subclavicular ligaments included in the upper lip of the breach by means of two U-shaped stitches of non-resorbable wire Thus the nipple is brought back directly to its normal level

4 In the submammillary zone of the gland, more or less wide cuneiform excision of the glandular tissue, according to circumstances, followed by stitching with resorbable thread and lower joining of the solid plane by means of a non-resorbable wire In this way, and in spite of very wide glandular excisions, the circulatory bundles of the internal and external mammary vessels have been completely spared

Third stage closing

1 Excision of the surplus skin so as to obtain two suture lines, i e a horizontal one in the submammary groove and a vertical one rejoining the first guide mark in the skin It will be noted that up till now the nipple, as well as the gland, has remained hidden in the subcutaneous cavity

2 Circular excision around the guide mark and exteriorization of the nipples Thus after these have been sutured, perfect symmetry is obtained

CONCLUSION

By this operation, while respecting the conditions necessary to preserve the physical integrity of the greatly reduced mammary gland, it is possible to obtain a normal form which corrects in women a deformity from hypertrophy or voluminous ptosis of the mammary gland, an impediment which can hardly be corrected by other means

Chirurgie Orthostructive des Seins Hypertrophies et Pendants qui Genent l'Activité Normale. M COELST

Depuis qu'on s'est rendu compte qu'il existe des cas d'hypertrophie et de ptose mammaire assez importants pour gêner le travail normal des femmes, le traitement chirurgical de ces cas est devenu un élément de signification d'importance sociale

Temps glandulaire (1) Mise à nu complète de la glande, (2) Excision fusiforme à grand axe horizontal et à petit axe vertical correspondant au degré de ptose à corriger dans la zone sus-mammilaire de la glande, (3) Réunion de la lèvre inférieure libre, de la brèche ainsi formée avec les ligaments sous-claviculaires inclus dans la lèvre supérieure de la brèche à l'aide de deux points en U en fil non résorbable Ainsi de mammelon est ramené directement à son niveau normal, (4) Dans la zone sous-mammalaire de la glande, excision cunéiforme plus ou moins large du tissu glandulaire selon les cas, suivie de suture avec du fil résorbableet des fixations vers le bas sur le plan solide avec du fil non résorbable de la sorte et malgré des excisions glandulaires très importantes, les faisceaux circulatoires des mammaires externe et interne ont pu être complètement conservés

Conclusion En respectant les conditions nécessaires à la conservation de l'intégrité physique des glandes mammaires fortement réduites, il est possible d'obtenir une forme normale tout en débarassant des femmes gênés par une hypertrophie ou une ptose mammaire volumineuse difficilement corrigeable par un autre moyen

Die Chirurgische Aufrichtung von Hypertrophischen Hangebrusten, die Normale Bewegungsfreiheit Behindern. M COELST

Nachdem man eingesehen hatte, dass es Falle von so schwerer Hypertrophie und Ptosis der Brust gibt, dass sie die normale Frauenarbeit behindern, ist die chirurgische Behandlung in Fällen von erheblicher hypertrophischer und ptotischer Bruste eine Frage von sozialer Bedeutung geworden

Stadien der Drusenoperation (1) vollstandiges

de 1946 à 1952 La plastie mammaire n'a pratiquement pas influé sur la sensibilité mammelonnaire dans 81.1% des cas cette sensibilité a été troublée temporairement dans 10.8% des cas et diminuée dans 6% des cas elle n a complètement disparu que dans 2.1% des cas. On a donc analysé l'influence des différents temps de la résection de la glande mammaire

Cette enquête a fait ressortir qu'il est bon d être quelque peu circonspect dans les cas de résection de la partie basse des seins et en particulier *quand on dissèque la glande pour la décoller de la* paroi thoracique au cours du temps de façonnage

Weitere Erfahrungen bei der Erhaltung der Stillfähigkeit und der Brustwarzensensibilität bei Brustverkleinerung. A. Ragnell.

Aus der Reihe von mehr als 1000 Patienten an denen der Verfasser und seine früheren und augenblicklichen Assistenten nach der Zweistiel-Methode 1946 berichtet, operiert haben, wurden die 359 Fälle von Brusthypertrophie ausgewählt, die der Verfasser seit 1941 persönlich untersucht und behandelt hat. Vier Fünftel dieser Patienten wurden einer einphasigen und ein Fünftel einer zweiphasigen Operation unterzogen.

Die Operation einschliesslich Resektion und Formung der Drüse schien die Stillfähigkeit der Patientinnen, die später Kinder hatten nicht herabzumindern.

In einer entsprechenden Serie von 333 hypertrophischen Brüsten die zwischen 1946 und 1952 operiert wurden, wurde die Wirkung auf die Sensibilität der Brustwarze untersucht. In 81.1% war die Sensibilität durch die Mammaplastik gänzlich unbeeinflusst in 10.8% vorübergehend gestört in 6% vermindert und in nur 2 1% *völlig aufgehoben* Der Einfluss der verschiedenen Phasen der Brustdrüsenresektion wurde analysiert.

Die Untersuchungen zeigten dass einige Umsicht bei der Resektion des unteren Teiles der Brust erforderlich ist, besonders bei dem Abpräparieren der Drüse von der Brustwand während der Formgebung

Experiencia de la Capacidad de Lactancia y Sensibilidad del Pezon en la Reduccion de Seno. A. Ragnell.

De un total de más de mil pacientes a quien el autor y su último ayudante han operado por el método bi-pediculado reportado en 1946, los 359 casos de hipertrofia mamaria fueron seleccionados por el autor y examinados personalmente y tratados desde 1941 Cuatro quintas partes de éstos pacientes fueron operados en un solo tiempo y una quinta parte en dos tiempos.

La operacion incluyendo resección y formación de la glándula, parece no haber reducido la capacidad de lactancia in aquellas que tuvieron hijos posteriormente

En una serie de 333 operaciones de hipertrofia mamaria entre 1946 y 1952 se estudió la sensibilidad del pezón En el 81.1% de los casos no se afectó la sensibilidad por la mastopexia en el 10.8% se perturbó temporalmente en el 6.0% fué reducida y en el 2 1% se perdió totalmente Se analizó la influencia de las diferentes fases de la resección de la glándula mamaria.

La investigación demuestra que es necesario ser prudente en casos de resección de la parte baja del pecho y *especialmente en la disección de la* glándula de la pared torácica durante el procedimiento de modelado

---

Orthostructive Surgery of Hypertrophic and Ptotic Mammary Glands Hindering Normal Activity M Coelst, Dr, *58 Av E Duray Bruxelles, Belgium*

About thirty years ago mammary reconstructive surgery was in its infancy

It was looked on with suspicion as being a purely freakish, if not a foolish, act. Several very different techniques followed one another each one having its defects and its qualities. However today the atmosphere has changed since it was realized that there are cases of hypertrophy and mammary ptosis of such a serious nature as to interfere with the normal work of women When considered from this point of view the surgical treatment of cases of gross hypertrophy and mammary ptosis is an element of social significance. This is so true that in our country the surgical reduction of mammary glands affected by hypertrophy and ptosis of that gravity is classified among the operations approved by the Social Insurance organizations

I thank the organizing Committee for the honour it has done me by calling upon me to speak today for that will enable me to describe to you a technique which I have perfected over a long period of time, and the best thing about which is that it can be employed indiscriminately in the two types of hypertrophy and ptosis. This technique preserves the integrity of glandular physiology on the one hand—at the same time guarding post-operative care from necrosis and from all other post operative complications—and on the other hand it guarantees the constitution of a normal form corresponding to artistic anatomy

Here is a summary of the various operative steps.

Cirugia Reconstructiva de la Hipertrofia y Ptosis de la Glandula Mamaria que Impedia Una Actividad Normal. M COELST

Desde que se tomó en cuenta que hay casos de hipertrofia y ptosis mamaria de tal naturaleza que impiden una función normal, el tratamiento quirúrgico de los casos más serios de hipertrofia mamaria y ptosis pasó a ser un elemento de importancia social considerable

Estado glandular (1) Enucleación completa de la glándula, (2) Escisión fusiforme con el eje mayor horizontal y con eje menor vertical correspondiente al grado de ptosis por corregir en la zona glandular submamilar, (3) Sutura del labio inferior libre para ser incluídos los ligamentos subclaviculares en el labio superior, por medio de dos puntos en forma de U con alámbre El pezón es traído hacía atrás a su nivel normal, (4) En la zona submamilar de la glándula escisión más o menos cuneiforme, del tejido glandular, de acuerdo con las circunstancias, seguido de sutura con material reabsorvible, y sutura inferior del plano sólido por medio de alámbre De éste modo y en caso de escisiones amplias, los paquetes vasculares de las arterias mamarias internos y externos han sido completamente librados

---

Derma-Fat and Ivalon Sponge for the Correction of the Hypoplastic Breast.

HAROLD I HARRIS, M D, *625 Bonnie Brae St, Los Angeles 57, California, U S A*

The subject of the use of foreign materials as substitutes for replacement of or the addition to the human body to simulate normal anatomical parts or tissues has in the past, as in the present, and will, no doubt, in the future present itself for our consideration

We do not turn our attention to these substitutes because of pure pleasure We are forced into such choice because of necessity Many years ago much research was done upon skin in an attempt to find replacement in the event there is a loss of a large area of skin This loss was usually the result of a burn Zoografts were used Then heterogenous grafts were used They were soon discarded Only as far back as 1939 an article was written on the use of heterogenous grafts by the coagulation contact technique as an emergency dressing until shock had been overcome Many scoffed at it, but Lister and Pasteur were also ridiculed Their accomplishments are now a matter of scientific fact Much writing and research have been done recently in the field of tissue transfer and growth What appears to be impossible today may be an accepted procedure tomorrow

Ivory, celluloid and metals of various types were used to supply the loss of rigid supports Many of the old plastic surgeons used these substances freely before they finally began the use of autogenous bone and cartilage Then bone banks and cartilage banks were developed Bovine cartilage was introduced Fruitful minds were endeavoring to find a source of materials which could replace normal tissue that was missing The use of fascia lata, the use of tantalum mesh for the repair of hernias was suggested Many of these substances were used because we were lacking the proper materials As something more physiologic was found, they replaced the substances previously used One could continue endlessly enumerating materials used at one time and then abandoned, also materials which are still being used

Hypoplastic breasts as such do not fall in the category of physical abnormalities in which, or by which, the life of the individual is at stake By the same token neither do hump noses, pendulous breasts, receding chins, or even club feet Yet we endeavor to find some means of correcting these deformities At one time we thought we had found a technique to correct the hypoplastic breast Many years ago some of our predecessors attempted to improve the size and shape of these breasts by the use of fat transplants You are all familiar with the story which is full of disappointments Most of the fat would usually absorb, if not all of it In some instances only part of it would liquefy and we felt very elated When infection occurred, there was no question as to what would happen to the implant To overcome this, some even mixed fat with cartilage to give it more body

Then came the use of the derma-fat graft This was a slight improvement but did not last long The same situation arose and again the fat would absorb in most cases The danger of fat infection and liquefaction was just as great

The use of pedicle transplants had a little more chance of survival, however, there were so many cases in this category that did not have enough tissue on the abdomen or any other area to make a pedicle even for one breast

In the past fifteen years many miraculous materials were developed through the use of

Freilegen der Drüse (2) spindelförmige Exzision in der submammillaren Drüsenregion mit der grösseren Achse in der horizontalen und der kleineren Achse in vertikaler Richtung entsprechend dem Grad der Ptosis die behoben werden soll (3) Die Vereinigung der unteren Wundlippe der so entstandenen Lücke mit den Subclavicular bändern die mittels zweier u-förmiger Nähte nicht resorbierbaren Drahtes in der oberen Wundlippe der Lücke angelegt sind Auf diese Weise wird die Brustwarze direkt auf eine normale Höhe zurückgebracht (4) In der Submammillarregion der Drüse werden mehr oder weniger breite keilförmige Exzisionen des Drüsengewebes gemäss den Umständen vorgenommen denen Nähte mit resorbierbaren Fäden und tiefere Vereinigung der kompakten Schichten mittels eines nicht resorbierbaren Drahtes folgen. Auf diese Weise und trotz sehr breiter Drüsenexzisionen werden die circulären Gefässbündel der inneren und äusseren Mammaria vollkommen verschont.

Schlussfolgerung es ist möglich, unter Beachtung der Bedingungen die notwendig sind, um die Intaktheit auch der stark reduzierten Milchdrüse zu erhalten eine normale Form zu erlangen, Frauen mit Hypertrophie und massiger Ptosis der Brustdrüse von ihrer Behinderung zu befreien, die sie auf andere Weise nicht korrigieren können.

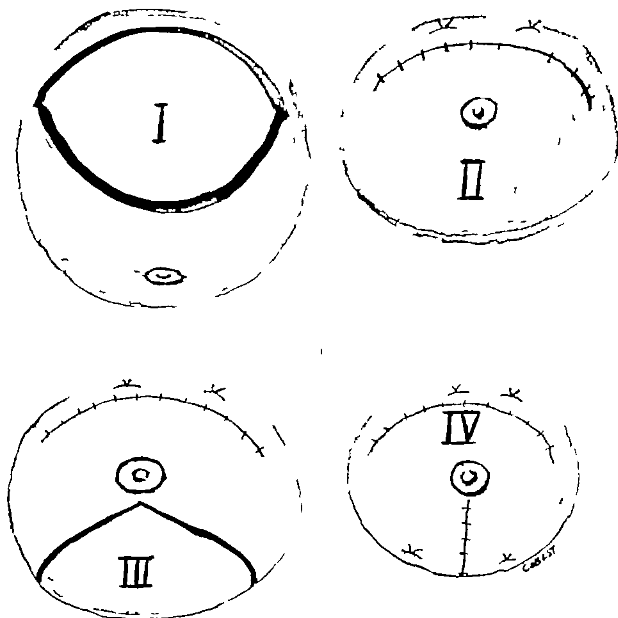
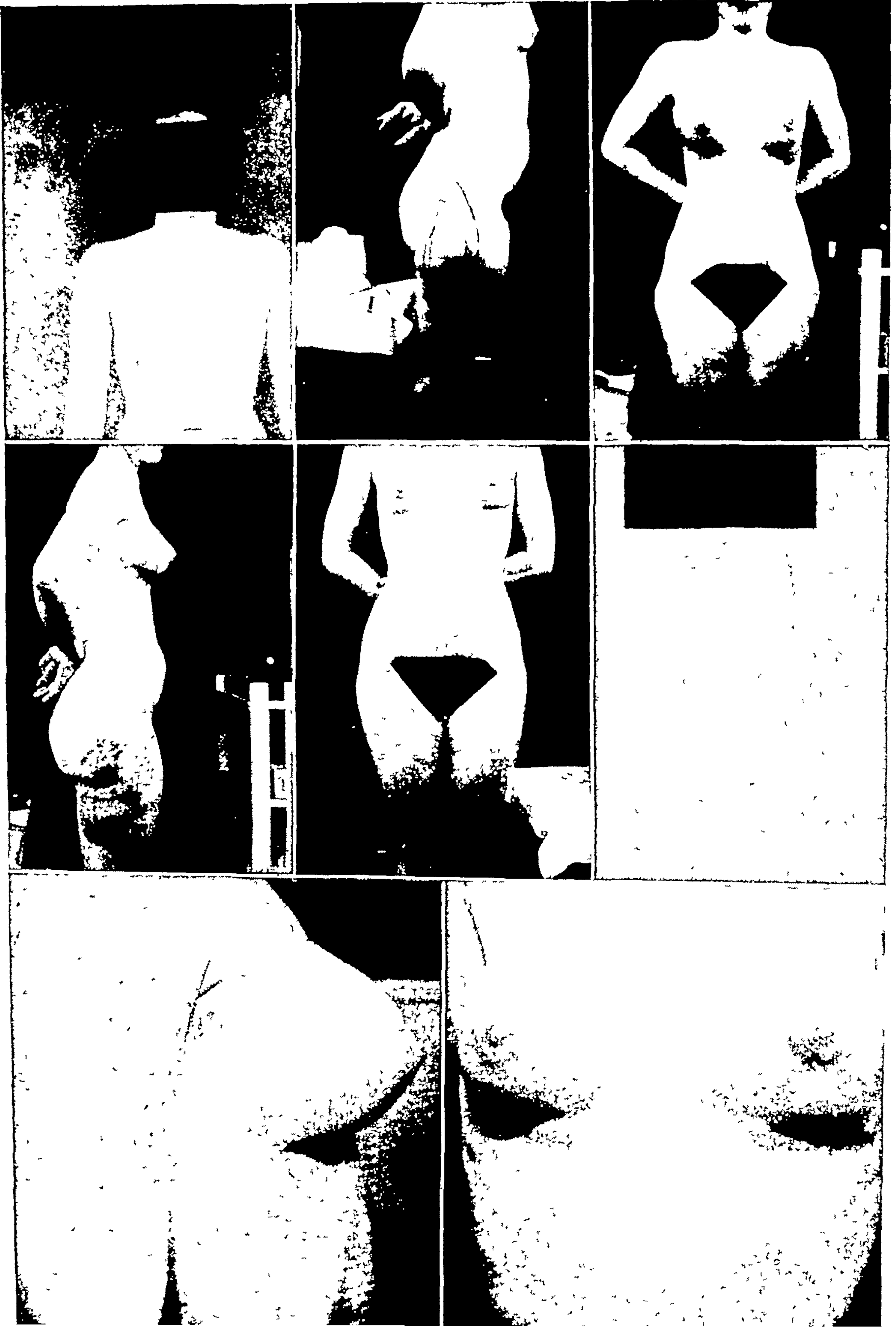


Fig 355



chemistry Among these was the evolution of plastic materials of one type or another As one science borrows from another the research scientist began experimenting with some of these plastics The research was done as is customary upon animals. Some of these plastics were buried first under the skin of the animal. Later, when seen that they were tolerated, they were used to put into the various cavities until almost all tissues in the animal were being invaded.

One of the substances which was used in these experiments was Ivalon, which is a polymer of polyvinyl alcohol with formaldehyde Much of this work was done by Grindlay and Clagget who first reported implants in the various tissues of dogs. The areas so used were Forehead, ear pleural space muscle fascia and nipple Their reports revealed that each case showed that the sponge was surrounded by a fibrous adherent membrane. There was evidence of extension of blood vessels into the outer layers of the sponge Ivalon is a white sponge material. When wet, it acts exactly as a sponge. Once it is wet and permitted to dry it becomes very hard. It is quite conceivable that it must follow that the reports of an inert material, which is tolerated by live tissues in addition to being soft and workable, should become the subject of human experimentation.

About three years ago a Hollywood plastic surgeon began its use as an inlay in the hypoplastic type of breast also in the reconstruction of breasts following unilateral or bilateral radical resection. He presented his findings before the California Society of Plastic and Reconstructive Surgeons From the story presented and the results obtained it appeared the ideal type of procedure for these conditions The subject of the possibility of carcinogenesis because of the foreign material was raised. Some condemned the procedure Others accepted it at once I was conservative and waited about one year In the meantime, I gathered all available material. I spoke again with Dr Pangman and he presented cases now over one year old. About this time I decided to operate on a few cases The basis of this report is upon a small series of eighteen (18) cases.

The derma fat grafts have already been discussed. As was stated previously you are all familiar with the action of these grafts To repeat, up until about three years ago I knew of no other manner in which to help this condition of the breast except by a derma-fat graft. It was during this time that a patient (Fig 356) presented herself with a hypomastia. Her domestic life was in strained circumstances because of the husband's attitude towards her under-developed mammae In the consultation the patient was advised as to the present status for relief of this condition Upon examination it was revealed that she had very wide thighs and large ptotic buttocks She was advised that the graft could be taken from the thigh. The facts concerning liquefaction and absorption and infection were stressed. The patient agreed to have the operation. Surgery was performed and an uneventful recovery within two weeks was effected The patient was happy the immediate post-operative result was satisfactory About four months later the patient returned. The graft in both breasts had almost completely absorbed She inquired about having more fat put in I explained to her the probability of the same process occurring nevertheless, she insisted it be done. The procedure was repeated, but the derma fat graft was taken from the buttocks this time. Again there was an uneventful recovery Patient was up and around in three days She appeared to be normal at the end of about ten days

About three months later she appeared again, and again, she was very unhappy The fat had absorbed and there was a slight irregularity at the inferior pole where the derm part had adhered and did not absorb It was at this time that I explained to her the use of the Ivalon sponge. All pros and cons regarding the possibility of infection and possible inability of some people to tolerate the sponge and of its eventual removal also the fact that it was still in the experimental stage and that there was a contro-

Fig. 356 (top left) Front view before surgery Note small breasts. (Top center) Side view before surgery Markings on thigh for excision for derma-fat graft Side view of breasts. (Top right) Front view after derma-fat implant in breast Note thighs and appearance of breast. (Center left) Side view of breast after first surgery and scar on thigh (Center row center) Front view after second derma-fat graft absorption. (Center right) Lateral view after second derma-fat absorption (Bottom right) Front view after Ivalon sponge prosthesis insert. (Bottom left) Lateral view after Ivalon sponge insert.

the inner sponge from coming in contact with the body fluids that this would keep the breast softer The outer shell of the prosthesis would attach itself to the surrounding tissues as before Again, the polyethylene sac would also prevent the ingrowth of fibrous tissue elements into the inner sponge

The fifth case with the compound prosthesis was not so kind Here drainage was first started in the left breast after the second week About the third week drainage started in the right breast This again was a serosanguinous drainage Culture showed no form of bacteria This, I felt, was a real case of inability to tolerate the Ivalon sponge Drainage persisted for two months and finally subsided Sponges were not removed

The next case in which a compound prosthesis was used developed a temperature of 101° after the second week There was slight pain in the breasts and redness around the outer margin of the breasts Drainage was established I felt reasonably secure about this infection because I felt that the farthest the infection could penetrate would be the polyethylene sac I carried on as I did with the case where infection took place with the simple sponge Knowing that the thickness of the shell was comparatively a fraction of that of the earlier sponges used, the condition would clear up more quickly I was sadly disappointed The breasts continued to swell, the redness increased and the temperature rose to 104° I felt that there must be a pocket somewhere I opened the polyethylene sac and large quantities of a greenish, thick foul-smelling purulent material came out The pain was relieved, the swelling subsided but the drainage continued Realizing that the anti-biotics would not penetrate the sac, I pulled it out with the inner sponge Immediate relief was effected The discharge became lessened It changed to a mixture of pus stained with blood

After about three weeks the drainage changed to a thick, bloody material and finally to a serosanguinous character This case has been treated for nearly five months Although there is good evidence of constant improvement and since the research has been most impressive, I feel that complete removal of the remaining sponge will be inevitable Others have removed the sponges on similar occasions This is the longest period of time that one has been treated to my knowledge Pangman states that he has removed infected sponges, permitted the area to completely heal, and four or five months later reinserted the sponge This is my plan at the present time

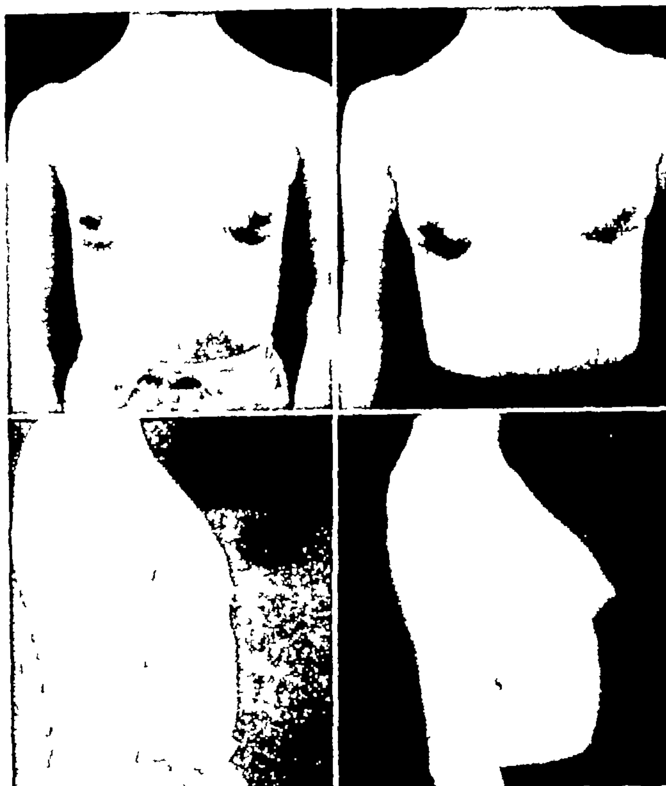


Fig. 357 Small, simple prosthesis (Top left) Front view before Ivalon sponge insert (Top right) Front view after Ivalon sponge insert (Bottom left) Lateral view before Ivalon sponge insert (Bottom right) Lateral view after Ivalon sponge insert

Conclusions

This procedure is still in the experimental stage There are many controversial and uncertain elements One of the foremost is whether or not the sponge may or may not have carcinogenic effect upon the tissues with which it comes in contact However, there is no more reason to expect this to occur than there is from the use of burying the metals previously described That is our only real concern This, of course, will only be answered as time passes The matter of tissue reaction, hardness and infection are qualities that I feel will in the very near future be solved Some relief from the hardness can be obtained by the injection of normal saline directly into the sponge The material is highly contaminable and special attention must be paid to the method of sterilization The directions

versy about the possibility of it being carcinogenic although it had not been proved also that she must assume all responsibility and consequences. This she agreed to do The patient was again submitted to surgery This time medium-sized implants of Ivalon sponge were inserted. Again there was an uneventful recovery The breasts are the same size as when inserted. They are more firm than usual to palpation. After this a number of patients were treated by the same technique and with similar results

About the ninth case, one side—the left, began to drain toward the end of the second week. The breast became swollen with bluish discoloration at the incision line The outer end of the incision was ruptured and this serosanguinous drainage continued for about four weeks before it ceased. At no time was there any rise in temperature. The breast was expressed twice daily there was no associated pain. The drainage stopped gradually At first the night drainage showed a tendency to slacken. The quantity this patient was able to express upon arising consistently lessened Absence of drainage for a twenty four hour period was next noted. Spontaneous closure occurred for several days at a time, then drainage would again begin. This seemed to continue in cycles of two and three days until it finally stopped.

A short time afterwards another case with the same type of sponge and the same technique was followed in about two weeks with redness and swelling in both breasts. There was a rise in temperature to 104 degrees Pain in both breasts Broad spectrum anti-biotics were given parenterally in large doses. The temperature persisted. The suture line was opened, profuse drainage resulted the breasts were expressed several times daily The discharge was of a thick purulent nature. After several days of established drainage, the pain and swelling subsided. The drainage continued smears showed a mixture of staphylococci and cellular debris Treatments of the patient continued for five months before she finally stopped draining The sponges were not removed. The patient was advised after about two months of treatment that we could clear up the infection if we removed the sponges Upon her insistence treatment was continued. To me the opportunity to follow the case to its completion was a rare chance.

Several more cases were done with the single prosthesis It was about this time that Dr Pangman told me about his compound prosthesis. He believed that a large percentage of the plain sponge prosthesis drained excessively even without infection. He stated that 10 per cent had to be removed for this reason.

Secondly the sponges became firm too hard, and were easily palpable as a foreign body

Thirdly shrinkage over a period of months was from 25 per cent to 75 per cent. The greater the shrinkage the harder the sponge became.

The first point in this triad conforms to a degree with my observations It so happens that simple drainage occurred in the ninth case. According to statistics that makes it even more than 10 per cent. I felt perhaps that the drainage was due to the inability of the tissues to tolerate the sponge. But since the drainage occurred only on one side that cannot be the answer

Pangman's point two also does not fully conform to my deductions I have noticed that some become quite firm and hard, others do not. There must be a reason for this also

Thirdly I cannot agree as to the amount of shrinkage

There is a difference between the amount of shrinkage that takes place in a prosthesis that does not have drainage and one that does. I feel that here too there is a good reason. The exudate is filled with all types of tissue cells. Even the deep parts of the sponge are infiltrated. Although it has been quite definitely established that there is no physical change in the sponge after removal from experimental implants it must be remembered that that was in cases where there was no drainage Where drainage occurred the changes in the sponge are the same as the changes in the periphery of the sponge under normal conditions and for that reason there is a generalized fibrosis with a greater tendency to shrinkage and hardening

There were then two reasons why I felt that the compound prosthesis should be more advantageous These were purchased from Dr Pangman who was gracious enough to have some made up for me I used about six of these The first four cases in which they were used were uneventful. I felt that this was the ideal. I also felt that because the polyethylene sac prevented

nombreux points pour lesquels les efforts du chirurgien plastique n'ont pas donné les résultats voulus L'action normale des greffes des tissus graisseux dans le nouveau milieu, la facilité de contamination, l'incertitude dans laquelle on est de l'importance de la résorption et enfin la liquéfaction du tissu en question ont découragé un grand nombre de chirurgiens

Plus tard, les résultats se sont trouvés améliorés quand on a découvert qu'il fallait utiliser le derme avec la graisse sousjacente Dans le cadre des tendances des autres branches de la chirurgie, on a recherché un corps étranger qui pourrait satisfaire aux conditions nécessaires On a alors utilisé les injections de paraffine Toutefois on n'a pas persisté dans cet emploi à cause des modifications de forme, des modifications de la température, de l'augmentation de poids et de la formation de paraffinomes

L'avènement des substances plastiques a fait que pendant deux ans on a conduit des recherches sur une éponse plastique en Ivalon On a entrepris son utilisation pour reconstruire les seins hypoplasiés On a suivi l'étude de l'aspect du sein, de ses caractéristiques physiques, des réactions tissulaires et des modifications psychologiques de la malade

L'auteur présente des photographies montrant l'aspect et les résultats obtenus

Haut-Fett-Transplantation und Plastischer Ivalon-Schwamm zur Verbesserung der Hypoplastischen Brust. HAROLD I HARRIS

Die Vergrosserung der hypoplastischen Brust ist eines der Dinge, die dem plastischen Chirurgen erhebliche Schwierigkeiten bereitet Das normale Verhalten von Fettransplantaten in ihrer neuen Umgebung, die Leichtigkeit von Verunreinigungen, die Ungewissheit uber das Ausmass der Absorption und seiner Verflussigung haben die meisten Chirurgen entmutigt

Spater, nach Verwendung von Haut- und Fettgewebe, verbesserten sich die Ergebnisse etwas Entsprechend der Tendenz anderer chirurgischer Zweige wurde nach einem Fremdkorper gesucht, der die notwendigen Erfordernisse erfullen wurde So kam es zur Anwendung von Paraffininjektionen Die Formveranderungen des Materials, Veranderungen durch Temperatur, der Gewichtszuwachs und die Bildung von Paraffinomen stellten bald seine Anwendung in Frage

Nach der Erfindung plastischer Materialien folgten Versuche mit Ivalon-Plastikschwammen uber eine Zeit von etwa zwei Jahren Man unternahm es, hypoplastische Bruste damit zu verbessern Das Aussehen der Brust, die anatomischen Charakteristika der Brust, die Reaktion der Gewebe und die Wirung auf die Psyche wurden festgestellt Fotographien, die das Assehen, die Grosse und die Ergebnisse zeigen, werden demonstriert

Corrección de la Mama Hipoplásica con Injerto de Grasa y Esponja de Ivalon. HAROLD I HARRIS

Una de las muchas condiciones que han puesto a prueba los esfuerzos de los Cirujanos Plásticos, es un método para reconstruír la mama hipoplásica La acción normal del transplante de grasa en su nueva localización, la facilidad de contaminación, lo variable de la cantidad de absorción y su licuefacción descorazonan mucho al cirujano

Mas tarde, cuando se supo que por medio del uso de la dermis con la grassa los resultados mejoraban algunas veces Siguiendo la tendencia de otras ramas de la Cirugía, se buscó un cuerpo extraño que llenara los requerimientos necesarios Se usaron inyecciones de parafina Los cambios en la forma del material, los cambios en la temperatura, el aumento de peso y la formación de parafinoma contraindicaron su uso

Con la llegada de materiales plásticos, se investigó durante dos años con la esponja plástica de Ivalon Se conoció su uso para construir mamas hipoplásicas Siguiéndose atentamente la apariencia de la mama, sus características físicas y los cambios psicológicos

Por medio de fotografías se ilustra la apariencia, las medidas y los resultados

---

The Operation of the Pendulous Abdomen with Conservation of the Navel.

HERBERT SCHRIMPF, Dr med , Dozent *From the Gynecological Department, University of Rostock, Rostock, Germany*

The performance of the operation begins with the circumcision of the navel Then a transverse incision above the navel is made which goes from the linea axillaris posterior, of one side to the other This incision separates the skin and the fat This is followed by a curved incision going convexly down which begins in one wound angle of the transverse incision and ends in the other wound angle The vertex of the curved incision will go down, dependent on the thickness of the paunch, on an average, as far as 2 centimetres above the mons Veneris Then this enclosed skin-fat mass is dissected free from the underlying deep fascia and discarded This undermining process is carried out nearly up to the xiphoid process The exposed fascia is now incised longitudinally in the midline both above and below the umbilicus to the extremes of the dissection

This allows a repair of the diastasis recti which I accomplish by suturing together the medial

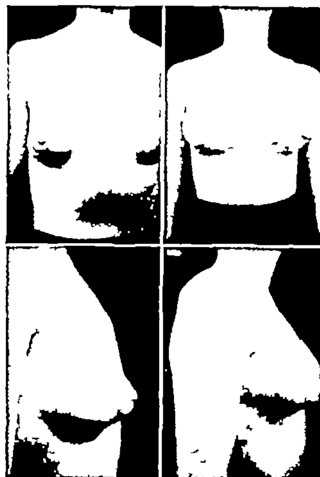


FIG. 358. Medium, compound Ivalon prosthesis (Top left) Front view before. (Top right) Front view after (Bottom left) Lateral view before. (Bottom right) Lateral view after



FIG. 359 Large Ivalon sponge prosthesis. Compound. (Top left) Front view before. (Top right) Front view after (Bottom left) Lateral view before (Bottom right) Lateral view after

in the literature accompanying the product would be sufficient if the exudates and transudates following surgery did not form such a nutritive medium for bacterial growth. The material should be boiled at least three different times under the strictest sterile conditions, and handled with clean gloves and new draping before its insertion. I also feel that gloves should be changed for each breast and new drapes applied.

I operate from the right side of the patient I prepare the right breast first, then the left breast. Then I change drapes wash my hands and insert the right prosthesis. The left prosthesis is then inserted. All the drainage I have had to date has been from the left breast. The infection was in the left breast. The infection in the compound prosthesis was in both breasts

It is possible with the next series of cases with the technique above outlined, that there will be less reaction drainage and probably less contamination drainage.

Those of you who are familiar with the terrific psychological problem some of these women face understand the need for this type of surgery and also realize that every effort must be made to perfect and standardize the use of some type of prosthesis.

REFERENCES

1 Gale, Joseph W., et al Journal of Thoracic Surgery Dec 1952, Vol 24, No 6 pp 587-910
2 Pangman, John W., and Wallace Robert M. Presented at the Pan Pacific Surgical Society Honolulu 1954
3 Grindlay and Claggett O R. Proc Staff Meetings Mayo Clinic 24 538-539 Oct. 12 1949
4 Oppenheimer B S et al Proc. of Society for Experimental Biology 1948 Vol. 67 p 33.
5 Harris Harold I Personal observations in the use of Ivalon sponge as a prosthesis in building up of soft tissues.

Dermo-Tissu Graisseux et Eponge en Ivalon Plastique pour la Correction des Seins Hypoplasiques. HAROLD I. HARRIS

La mise au point d'une méthode de reconstruction des seins hypoplasiques constitue un des

nombreux points pour lesquels les efforts du chirurgien plastique n'ont pas donné les résultats voulus L'action normale des greffes des tissus graisseux dans le nouveau milieu, la facilité de contamination, l'incertitude dans laquelle on est de l'importance de la résorption et enfin la liquéfaction du tissu en question ont découragé un grand nombre de chirurgiens

Plus tard, les résultats se sont trouvés améliorés quand on a découvert qu'il fallait utiliser le derme avec la graisse sousjacente Dans le cadre des tendances des autres branches de la chirurgie, on a recherché un corps étranger qui pourrait satisfaire aux conditions nécessaires On a alors utilisé les injections de paraffine Toutefois on n'a pas persisté dans cet emploi à cause des modifications de forme, des modifications de la température, de l'augmentation de poids et de la formation de paraffinomes

L'avènement des substances plastiques a fait que pendant deux ans on a conduit des recherches sur une éponse plastique en Ivalon On a entrepris son utilisation pour reconstruire les seins hypoplasiés On a suivi l'étude de l'aspect du sein, de ses caractéristiques physiques, des réactions tissulaires et des modifications psychologiques de la malade

L'auteur présente des photographies montrant l'aspect et les résultats obtenus

Haut-Fett-Transplantation und Plastischer Ivalon-Schwamm zur Verbesserung der Hypoplastischen Brust. HAROLD I HARRIS

Die Vergrosserung der hypoplastischen Brust ist eines der Dinge, die dem plastischen Chirurgen erhebliche Schwierigkeiten bereitet Das normale Verhalten von Fettransplantaten in ihrer neuen Umgebung, die Leichtigkeit von Verunreinigungen, die Ungewissheit uber das Ausmass der Absorption und seiner Verflussigung haben die meisten Chirurgen entmutigt

Spater, nach Verwendung von Haut- und Fettgewebe, verbesserten sich die Ergebnisse etwas Entsprechend der Tendenz anderer chirurgischer Zweige wurde nach einem Fremdkorper gesucht, der die notwendigen Erfordernisse erfullen wurde So kam es zur Anwendung von Paraffininjektionen Die Formveranderungen des Materials, Veranderungen durch Temperatur, der Gewichtszuwachs und die Bildung von Paraffinomen stellten bald seine Anwendung in Frage

Nach der Erfindung plastischer Materialien folgten Versuche mit Ivalon-Plastikschwammen uber eine Zeit von etwa zwei Jahren Man unternahm es, hypoplastische Bruste damit zu verbessern Das Aussehen der Brust, die anatomischen Charakteristika der Brust, die Reaktion der Gewebe und die Wirung auf die Psyche wurden festgestellt Fotographien, die das Assehen, die Grosse und die Ergebnisse zeigen, werden demonstriert

Corrección de la Mama Hipoplásica con Injerto de Grasa y Esponja de Ivalon. HAROLD I HARRIS

Una de las muchas condiciones que han puesto a prueba los esfuerzos de los Cirujanos Plásticos, es un método para reconstruír la mama hipoplásica La acción normal del transplante de grasa en su nueva localización, la facilidad de contaminación, lo variable de la cantidad de absorción y su licuefacción descorazonan mucho al cirujano

Mas tarde, cuando se supo que por medio del uso de la dermis con la grassa los resultados mejoraban algunas veces Siguiendo la tendencia de otras ramas de la Cirugía, se buscó un cuerpo extraño que llenara los requerimientos necesarios Se usaron inyecciones de parafina Los cambios en la forma del material, los cambios en la temperatura, el aumento de peso y la formación de parafinoma contraindicaron su uso

Con la llegada de materiales plásticos, se investigó durante dos años con la esponja plástica de Ivalon Se conoció su uso para construir mamas hipoplásicas Siguiéndose atentamente la apariencia de la mama, sus características físicas y los cambios psicológicos

Por medio de fotografías se ilustra la apariencia, las medidas y los resultados

---

The Operation of the Pendulous Abdomen with Conservation of the Navel.

HERBERT SCHRIMPF, Dr med , Dozent *From the Gynecological Department, University of Rostock, Rostock, Germany*

The performance of the operation begins with the circumcision of the navel Then a transverse incision above the navel is made which goes from the linea axillaris posterior, of one side to the other This incision separates the skin and the fat This is followed by a curved incision going convexly down which begins in one wound angle of the transverse incision and ends in the other wound angle The vertex of the curved incision will go down, dependent on the thickness of the paunch, on an average, as far as 2 centimetres above the mons Veneris Then this enclosed skin-fat mass is dissected free from the underlying deep fascia and discarded This undermining process is carried out nearly up to the xiphoid process The exposed fascia is now incised longitudinally in the midline both above and below the umbilicus to the extremes of the dissection

This allows a repair of the diastasis recti which I accomplish by suturing together the medial

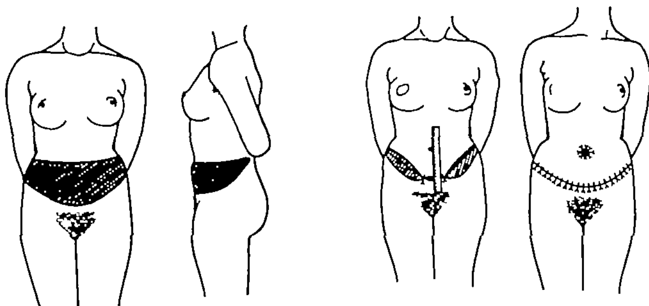


FIG 360

margins of the recti muscles The repair is strengthened by doubly suturing the overlapped fascia over the muscles

Then the upper abdominal flap is drawn downward over the umbilicus and sutured to the lower flap by 2 temporary sutures on each side of the midline.

After that according to the formula

$$\frac{\text{Length of the body}}{10} - 2 \text{ cm}$$

measure out the situation (new site) of the umbilicus by the distance from the superior border of "the fluff (crines) upward.

At this point a section of skin 1.5-2 cm wide and 1 cm high is removed for the implantation of the umbilicus. This is done by removing the temporary sutures and with small forceps drawing the umbilicus into the prepared foramen and suturing it there

Two subcutaneous drains are placed from the umbilical area *to the lateral wound* angles.

Finally the upper and lower abdominal flaps are approximated with both fat and skin sutures

The first indication for this operation is medical eczema, from constant rubbing of opposed skin surfaces and pains in the loins The second indication is functional The third indication for this operation is cosmetic The *pendulous* abdomen having been removed eczemas and pains disappear the patient is active again and capable of work.

As to mortality *up to now* 15 patients have been operated upon according to this method, and there have been no operative deaths. It seems important to us that this plastic must be regarded as a major operation It is not advisable as was customary with many surgeons, to combine the pendulous abdomen plastic with an intra-abdominal operation Two operations lengthen the surgical procedure too much and increase the operative trauma. Only persons with sound heart and circulatory conditions should of course, be operated upon.

The functional and cosmetic result of this pendulous abdomen operation is very good. Recurrences have not been observed although some of the patients have been followed years after their operations. The freedom from recurrence is ascribed to the fact that after the ablation of the central abdominal skin which has the strongest faculty for fat accumulation there remains peripherally situated abdominal skin, which accumulates fat to a small extent and is not capable of developing a *pendulous* abdomen. We recommend the plastic procedure described as the functional and cosmetic result is good and because the difficulties of the pendulous abdomen may be abolished by no conservative treatment.

Universitäts-Frauenklinik
Rostock, Germany

L Opération de l'Abdomen Pendulum avec Conservation de l Ombilic. HERBERT SCHMIDT

L auteur commence par faire une incision circulaire autour de l ombilic. *Il pratique ensuite une*

incision à 1 cm au-dessus de l'ombilic qui rejoint les deux lignes axillaires postérieures A partir des angles de cette incision on pratique des incisions convexes se dirigeant vers le bas qui rejoignent le mont de Venus sur la ligne médiane Ce lobe cutané est décollé du fascia On cécolle ensuite le tissu graisseux sous-cutané depuis le rebord supérieur de la plaie jusqu'au rebord costal On corrige le diasthasis des droits au-dessus et au-dessous de l'ombilic Celui-ci est ensuite implanté dans la peau qui à l'origine se trouvait audessus de lui en tenant compte de la formule 1/10e de la longueur du corps 2 cm Le chiffre ainsi obtenu sera reporté en hauteur à partir du rebord supérieur du mont de Vénus Enfin on suture le lobe cutané abdominal supérieur à l'inférieur

Die Hangebauchplastik mit Erhaltung des Nabels. HERBERT SCHRIMPF

Ich beginne mit der Umschneidung des Nabels Dann wird ein querer Schnitt angelegt, der 1 cm uber dem Nabel von einer hinteren Axillarlinie in die andere verlauft Von den Wundwinkeln des Querschnittes wird ein nach unten konvexer Schnitt ausgefuhrt, der in der Mittellinie mit seinem tiefsten Punkt fast den Mons veneris erreicht Der so umschnittene Hautfettlappen wird von der Faszie entfernt Dann wird das subcutane Fettgewebe vom oberen Wundrand der Bauchhaut an bis zum Rippenbogen von der Faszie losgelost und die Rectusdiastase oberhalb und unterhalb des Nabels korrigiert Den Nabel implantiert man nach der Formel ein zehntel der Korperlange minus 2 cm in die ursprunglich uber ihm gelegene Bauchhaut Das so gefundene Mass muss vom oberen Rand des Mons veneris nach oben aufgetragen werden Schliesslich wird der Wundrand des oberen Bauchhautlappens an den unteren genaht

La Operación del Abdómen Péndulo con Conservación del Ombligo. HERBERT SCHRIMPF

Empezamos con la circuncisión del ombligo Se realiza entonces una incisión transversal que pasa a un centímetro por arriba del ombligo y va de una a otra de las líneas axilares Del extremos de esta incisión se traza otra, convexa hacia abajo, con cu punto mas bajo en la línea media y que subre gradualmente hasta el extremo homólogo El punto mas bajo quéda cerca del monte de venus Se reseca entonces el fragmento de piel de la fascia Se despega el tejido celular subcutáneo del borde superior de la herida de la fascia hasta el arco costal Se corrige la diastasis de los músculos rectos tanto por encima como por debajo del ombligo El ombligo se implanta en la piel situada originalmente por encima, de acuerdo con la fórmula 1/10 de la longitud del cuerpo menos dos centímetros La medida encontrada por este medio debe tomarse a partir del borde de la herida, hacia arriba Por ultimo, la piel de ambos bordes de la herida se sutura

X

GENITALS

A Male Genitals

Owing to illness the paper of Bengt Johanson, M D, of Stockholm, Sweden, was not received in time for publication. Abstracts of the paper are given below

Hypospadias, Épispadias et Exstrophie de la Vessie: Résultats du Traitement Chirurgical. BENGT JOHANSON

Depuis 1950 l auteur a traité et suivi plus de 200 cas d'hypospadias Il a utilisé la méthode de Denis-Browne. Il montre comment l'urèthre reconstruit croit avec les organes génitaux externes

Il énumère les complications et fait une comparaison avec une série de cas traités selon Ombredanne et MacIndoe

Les cas d épispadias traités au cours de la même période sont également rapportés Ici également on reconstruit l'urèthre en enfouissant une lanière d épithélium intact. On vient à bout de l'importance pourcentage d incontinence dans l épispadias à l'aide d'une plastie du col vésical.

Dans le cas d extrophie de la vessie cette dernière est fermée et une fois la plastie cervicale faite, on l enfouit sous la paroi abdominale Des clichés radiographiques montrent les résultats en ce qui concerne l'incontinence

Hypospadie, Epispadie und Ektropie der Blase: Chirurgische Behandlungsergebnisse BENGT JOHANSON

Der Autor hat seit 1950 mehr als 200 Fälle von Hypospadie behandelt und nachuntersucht bei denen die Denis Browne sche Technik angewandt wurde Wie die neu geformte Urethra mit dem äußeren Genitale wächst, wird demonstriert. Die Komplikationen werden umrissen und ein Vergleich mit einer Serie von Fällen, die nach Ombredanne u McIndoe vorgenommen worden sind, angestellt.

Es wird über die Fälle von Epispadie, die während desselben Zeitraumes behandelt wurden, berichtet. Auch hier wurde die Urethra durch Versenken eines Streifens intakten Epithelums gebildet. Die in einem hohen Prozentsatz bei Epispadie auftretende Inkontinenz wird mit einer Blasenhals-Plastik behandelt Bei Ektropie der Blase wird diese verschlossen und nach Ausführung der gleichen Blasenhals-Plastik unter die Bauchwand verlegt.

Röntgenbilder zeigen die Ergebnisse bezüglich der Kontinenz

Hipospadias, Epispadias y Extrofia de la Vejiga. Resultados del Tratamiento Quirurgico. BENGT JOHANSON

Desde 1950 el autor ha completado el tratamiento y ha seguido la evolución de 200 casos de hipospadias. Usó la técnica de Denis Browne Se demostró que la uretra construida crece al hacerlo los genitales externos

Se señalan las complicaciones y se compara con las series tratadas al modo de Ombredanne y McIndoe

Los casos de epispadias tratados durante el mismo periodo de tiempo también se reportan. Tambien aqui, la uretra se construye sepultando una banda de epitelio intacto El alto porcentage de incontinencia en epispadias es corregido con cuello de vejiga plástico

En la extrofia de la vejiga el ultimo se cierra y después el mismo cuello plástico se entierra bajo la pared abdominal Las radiografias demuestran el resultado con respecto a la continencia

---

Epispadias. VITTORIO CONSIGLIO M D, Sezione di Chirurgia Plastica Ospedale Civile di Andria *Bari Italy*

A case of high-degree sub-pubic epispadias associated with preoperative total incontinence, was observed in a six year-old boy

At the first stage (October 1954) correction of the dorsal contracture was performed and the

upper portions of the corpora cavernosa were sutured in order to relieve the incontinence which disappeared for ten days after catheter removal It then reappeared and was of the orthostatic type No attempt was made at that time to exercise mental control by the patient

At the second stage (February, 1955) the Cantwell-Young method was used The cosmetic and functional results were initially both very satisfactory For fifteen days after catheter removal the boy was completely dry, no incontinence at all being observed From then on, and exactly concurring with the date of reestablishment of his contacts with his friends in the hospital, incontinence reappeared and was again of the orthostatic type It was then thought the cause could be the absence of mental control, the boy being insufficiently developed from the psychological point of view From then on a mental education method was strictly applied and has already given satisfactory results

Four slides were projected to illustrate this case (1) Lateral aspect of the lesion, (2) Frontal aspect, (3) Appearance after first stage operation, showing elongation of the penis, (4) Appearance after second stage, showing further elongation of the penis and micturition (No illustrations accompanied the article for publication)

Epispadias. Vittorio Consiglio

Il a été noté que la rééducation mentale a une grande importance pour contrôler l'incontinence d'urine chez un garçonnet de 6 ans opéré d'épispadias sus-pubien par la méthode de Cantwell-Young

Epispadie. Vittorio Consiglio

In einem Fall von subpubischer Epispadie bei einem 6 jahrigen Jungen, der nach der Cantwell-Young'schen Methode operiert wurde, wurde festgestellt, dass die psychische Umerziehung eine grosse Rolle in der Beherrschung der Inkontinenz spielt

Epispadias. Vittorio Consiglio

Se ha encontrado en un caso de epispadias subpúbico en un niño de seis años operado bajo la técnica de Cantwele-Young, que la reeducación mental, tiene una gran importancia para controlar la incontinencia

The Reconstructive Surgery of the Adult Penis.

Patrick Clarkson, F R C S, *Guy's Hospital, London, England*

My subject is not one about which I am entitled to any dogmatism but the size of the field to be covered and the time at my disposal makes it likely that my views will sound dogmatic when they are not at all intended to be so

I propose to discuss some of the problems concerned in, with special reference to the technical difficulties

(1) Adult Hypospadias
(2) Adult Epispadias and Ectopia Vesicae
(3) Correction of Circumcision Complications
(4) Total Reconstruction of the Penis after Amputation
(5) Penile Reconstruction in Sex Conversion

(1) Hypospadias

I would first like to express my view that the Denis Browne modification of the Marion-Duplay operation (i e a one stage urethral reconstruction by advancing lateral skin flaps over a buried strip of skin, under the protection of a posterior urethrostomy) is the most valuable and practicable of current methods of repair By its use it is possible to obtain, with less than the usual complications, the objectives of surgery in the treatment of this common important congenital deformity, i e the provision of a urethra which can project a tidy urinary stream and the ejaculate from the region of the tip of a straight penis, and at the same time is of sufficient calibre to transmit a cystoscope (should such be necessary in the later management of a genito-urinary illness)

I have two observations which I would especially emphasise The first is my view that it is not necessary for the new meatus to be at the exact tip of the penis Bengt Johanson has shown in his field a technique by which this objective can be obtained, but full sexual and urinary function are possible with a meatus a little proximal to the tip, in the groove under the glans Reconstruction to this point avoids scarring and partial coverage of irreplaceable glandular skin It also lessens the risk of a meatal stricture which, though capable of correction, involves further operative treatment

My second point concerns the use of the Denis

Browne method for adults Of my five adult patients two have had a severe return of the chordee. That is, the original chordee was corrected at a preliminary operation, at the next the urethra was reconstructed under posterior urethrostomy protection by the Denis Browne method. In the succeeding months the chordee returned sufficiently to make full penetration and successful deposit of the ejaculate in the region of the cervix unlikely It seems to me that this may prove to be a complication of the method in a significant proportion of cases Soft though the skin is in healed penile wounds nevertheless the marginal outgrowth of epithelium from the buried skin strip (by which the reconstructed urethral tube is formed) must be slower in adults than in children. In some adults longitudinal fibrous bands appear to form along the new urethra and result in a return of the chordee

I have one further minor point and that is to say that I agree that it is worth while in most cases for cosmetic reasons to do a late plastic revision of the scar left on the dorsum of the penis by the longitudinal relaxing incision which is made at the time of the urethral reconstruction

(2) Epispadias

For practical purposes I believe this problem is best discussed under two headings i. Epispadias without ectopia vesicae ii Epispadias with ectopia vesicae.

i. *Epispadias without ectopia vesicae* In the mildest of these cases there may be complete continence with the urinary stream and ejaculate running on a dorsal gutter on the penis to the region of the dorsum of the glans. Surgery is seldom indicated If it is, it is a simple reduction of the meatus, which is often spatulate to provide a tidy stream and more normal appearance. It is the incontinence which in the majority of cases provides the first and the most important of the therapeutic problems. My colleagues at Guy's Mr W D Doherty and Mr F R. Kilpatrick, have demonstrated to me the value of approaching the region of the membranous urethra by splitting the symphysis pubis With the whole of the anterior surface of the urethra and the bladder neck exposed it is possible to tighten the proximal urethra by excising excess circumference of the urethra and the bladder neck This tightening can restore a large measure of continence. One of the chief problems from the procreative point of view of these cases is the shortness of the penis. It seems to me that it should be practicable through this split symphysis approach, to mobilise the bladder neck and prostate, displace them forward an appreciable amount, and so in fact lengthen the penis by lengthening that part of the urethra which projects beyond the symphysis (after appropriate skin cover has been provided) Although it is quite true that in adolescent and adult life considerable growth of the external portion of the penis occurs I believe that this is often quite inadequate for full sexual function There is too from this point of view often need of correction of the dorsal curvature of the short penis For such cases I have increased the apparent length of the penis by dissecting it from the symphysis and covering the upper raw surface with an abdominal rotation flap Increase in apparent length of the undersurface may be obtained from scrotal flaps which result in increase in effective length of the penis by posterior displacement of the peno-scrotal junction When the meatus is well proximal on the penis I have found that a reverse Denis Browne type of operation will readily bring the meatus to the region of the dorsum of the glans It has not been found necessary to carry it through the glans onto the undersurface of the tip

ii. *Epispadias with ectopia vesicae* I have treated only one such case through to completion. The problems involved are (1) the formation of a penis of adequate length for penetration from the remnants of the bi-sected glans which lies in the region of the symphysis, and (2) the provision of a channel from the region of the tip of this glans to the orifices of the ejaculatory ducts, which open in small pits in the mucosa on the lower abdominal wall immediately above the region of the symphysis. My patient who was referred to me by the late Sir Launcelot Barrington Ward, about the age of 22 wanted to get married In early infancy Sir Launcelot had most successfully transplanted both ureters into the colon and had later excised the remnants of the bladder mucosa, leaving only a small inferior area into which numerous pits opened The patient had normal testicles

and stated that he had spontaneous ejaculations from some of the pits in this region The first problem was the identification of the pit beds (of which there were about 20) which were the ejaculatory ducts This was determined at operation by the injection of methylene blue into each vas Prostatic massage then produced a flow of blue from the appropriate beds The split glans was dissected from the region of the symphysis and the dissection was carried posteriorly and deeply behind the ejaculatory ducts The two halves of the glans were then joined and a roof to the gutter between these half glans, along the shaft of the reformed penis from the symphysis region, was provided by a preformed large abdominal flap This gave in the first instance a short straight penis which was unduly bulky because of the excess abdominal subcutaneous tissue which was incorporated in the flap The patient has refused subsequent revisional operations, maintaining that full penetration and normal sexual relations occur now that he is married and that no further surgery is necessary But he has so far not had children although, he says, the ejaculate projects from the tip of the penis

(3) Circumcision Accidents

i *Loss of penile skin* Undue traction on the prepuce at the time of circumcision may lead to almost total loss of the normal penile skin, and a glans imbedded in the subcutaneous tissues of the symphysis region A reasonable correction, although the end result lacks to some extent the softness of normal penile skin, is given by a free graft replacement This free graft is circumferential and restores the length of the penis The operation is not always free from trouble and in one case of mine excess of pressure on the graft resulted in a small urethral fistula which had to be closed at a later operation

ii *Loss of the distal urethra* This must be a rare complication, but I have seen it in one Indian boy who had had more than one circumcision operation in infancy After one of these operations the ventral surface of the distal 1″ of his urethra had sloughed The result was a wide spatulate meatus on the under surface of the penis about 1″ proximal to the tip of the glans The exposed urethral mucosa rubbed on his trousers He had recurrent attacks of urethritis Reconstruction of the distal urethra, by the Denis Browne method, was followed by relief of attacks of urethritis

(4) Total Reconstruction of the Penis

I believe that the Gillies method of total penile construction is the most valuable of those available today In this method a double tube pedicle is formed about 10″ in length, with the reversed inner tube forming a full thickness, non contractile skin lining of about 1″ in circumference This double tube is raised on the lower abdominal flank Its length admits complete reconstruction from the perineum when this is necessary Its full thickness skin lined urethra is free from the high instance of late stricture formation which is so often seen in urethras made from split skin grafts The good surgical quality of this inner tube is such that a secure junction can be made to the membranous stump of the urethra in the perineum with the minimum risk of stricture and fistula formation The subcutaneous tissue in the tube can also permit, at least for a time, the insertion of rigid implant It is also possible that the bone grafting technique described by Professor Munawar Ali, in which tibia is used, might permit the provision of a permanent rigid implant

(5) Penile Reconstruction in Sex Conversion

The application of this technique of penile reconstruction to the problems of sex conversion is a most difficult one It is certainly one in which most of us feel the need of guidance There are many patients for whom most doctors would consider the reconstruction of a penis reasonable medical treatment There are many others in which such surgery would be considered meddlesome In Common Law there is no legal definition of sex But in addition to the genetic and hormonal effects, there are psychological and environmental considerations which play their part in determining the predominant sex of an individual Most general rules are unreliable in extreme cases and certainly each patient presents a different problem My own view is that castration should never be considered, however strong the arguments put forward But there are people who have been brought up since childhood in the wrong sex

Perineal hypospadias sometimes provides a straightforward example of this. One such case of mine was a cryptorchid who had survived school, the Women's Royal Army Corps and life as a domestic servant, before he/she was examined and was found quite clearly to be a male. The correction of the chordee and the reconstruction of the urethra was clearly indicated, justified and completed. At the other end of the scale, amongst those seeking construction of a penis are frank homosexuals whose entire external genitalia are completely female although their personality and some other anatomical features may be decidedly male. It is more than doubtful if any of these should be accepted for surgery with a view to construction of a penis.

Consideration of the converse problem of sex conversion from male to female provides difficulties of selection of legitimate cases for surgery which are even greater, although the surgery of the provision of a vagina can be done in fewer stages and with much less time than the penile reconstruction takes. Certainly some lead about the selection of legitimate cases would be very helpful to plastic surgeons, to most of whom requests for surgery of this sort from patients and doctors are not so uncommon and are generally of great difficulty. Such guidance would clearly be based on ethical as well as purely medical considerations.

In conclusion I would like to consider for a moment those pathetic infants in whom there is virtually complete disorganisation of the genito-urinary and intestinal tracts. Such a case is a patient whom I recently saw in association with Mr R. Lawrie in whom an ectopia vesicae was combined with an atresia of the anus. While I would agree with the general principle that when it is difficult to tell the sex of an infant at birth, it is probably wisest to call it a boy (as it will most likely turn out to be a perineal hypospadias), nevertheless when there is complete disorganisation involving the whole of the cloaca, it seems to me that the best thing for the child is to call it a girl. It is after all much easier for a human being to go through life as a neuter female, than to do so as a male who has gross anatomical abnormalities of the external genitalia as well as having very little sex feeling.

Chirurgie Reconstructive du Penis chez l'Adulte. PATRICK CLARKSON

On discute quelques-unes des difficultés techniques que l'on peut rencontrer dans ces cas:

1. Hypospadias chez l'adulte.
2. Epispadias et ectopie de la vessie chez l'adulte.
3. Correction des complications de la circoncision.
4. Reconstruction totale du pénis après amputation.
5. Reconstruction du pénis dans le changement de sexe.

On rapporte les résultats obtenus par la mise en oeuvre de l'opération de Marion Duplay modifiée par Denis Browne. On fait état des avantages et des complications. On décrit les réparations à la suite de divers accidents consécutifs à une circoncision pratiquée chez le tout jeune enfant ainsi que les méthodes pour corriger la perte de l'urètre pénien antérieur et celle de la totalité de la peau du pénis. On donne les raisons pour lesquelles on préfère la méthode du double pédicule tubulé de Gillies pour la reconstruction totale du pénis après amputation. L'avantage réside particulièrement dans la sécurité de la jonction de l'extrémité du pédicule tubulé interne et du moignon uréthral et de l'absence de sténose et de fistule à ce niveau. Ce double pédicule peut aussi permettre l'introduction d'un implant rigide. On discute également les questions soulevées par la reconstruction du pénis chez les sujets intersexués et chez les hermaphrodites. Le médecin devra également se souvenir que pour un adulte il est généralement préférable d'être une femelle neutre qu'un mâle hypogonadique.

Wiederherstellungschirurgie des Erwachsenen Penis. PATRICK CLARKSON

Es werden einige der technischen Schwierigkeiten diskutiert betreffs

1. Hypospadie beim Erwachsenen.
2. Epispadie und Ektopia vesicae beim Erwachsenen.
3. Korrektion von Komplikationen nach Beschneidung.
4. Totale Wiederherstellung des Penis nach Amputation.
5. Penisplastik bei Sexual-Konversion.

Ergebnisse nach Anwendung der Marion Duplay Operation mit der Denis Browne'schen Modifikation werden beschrieben. Auf Vorteile und Komplikationen wird hingewiesen. Die Wiederherstellung nach verschiedenen Verletzungen bei der Beschneidung im Säuglingsalter schliessen Methoden für die Korrektion des Verlustes der vorderen Urethra und des Verlustes der gesamten Penishaut ein. Bezüglich der totalen Wiederherstellung des Penis nach Amputation werden die Gründe für die Bevorzugung der Doppelrundstiellappen-Methode von Gillies angegeben. Der Vorteil liegt besonders in der Sicherung der Vereinigung zwischen dem

inneren Rundstiellappen und dem Urethralstumpf und dem Fehlen von Strikturen und Fisteln an der Vereinigungsstelle Dieser gedoppelte Rundstiellappen ermoglicht ausserdem das Vorhandensein eines steifen Implantates Fragen im Zusammenhang mit Wiederherstellung des Penis bei intersexuellen und hermaphroditen Typen werden ebenfalls besprochen Der Arzt sollte bedenken, dass es im allgemeinen besser ist, als Erwachsener ein neutrales weibliches Wesen als ein hypogonadischer Mann zu sein

Reconstruccion Quirurgica del Pene en el Adulto. PATRICK CLARKSON

Algunas de las dificultades técnicas son señaladas en primer término

1 Hipospadias en el adulto
2 Epispadias en el adulto y ectopia vesical
3 Corrección de complicaciones después de la circunsición
4 Reconstrucción total del pene después de amputación
5 Reconstrucción de pene en la converción sexual

Se describen los resultados con el uso de la operación de Marion Duplay modificada por Denis Browne Se señalan las ventajas y las complicaciones La reparación en diferentes accidentes en la circuncición en el niño incluyen métodos para corregir la uretra peneana anterior, y la pérdida total de la piel del pene Para la reconstrucción total del pene después de la amputación, se dan las razones por las cuales se prefiere el método de Gillies del doble tubo pediculado La ventaja estriba principalmente en la seguridad de la unión de la extremidad del tubo interior y del muñon uretral, y en evitar la estrechez y la fistula en esta unión Este doble tubo pediculado puede también permitir la presencia de un implante rígido Se refieren los problemas concernientes a la reconstrucción peneana en los tipos intersexuales y hermafroditas El médico debe tener en mente que generalmente es mejor en la vida adulta una mujer neutra que un hombre con hipogonadismo

---

Repair of Penile and Scrotal Skin.

ROBERT CHARLES BELL, M B , Lond , F R C S Eng *The Plastic Surgery Unit, Shotley Bridge General Hospital and the Department of Surgery, University of Durham*

The increasing use of revolving shafts in farm machinery has produced an upsurge in traumatic denudation of the penis and scrotum Owens[1] only found two cases reported before 1900 in an extensive search of the literature while Banham[2] described 4 cases occurring within the boundaries of Yorkshire in five months in 1947 and Baxter[3] found 50 cases reported in the literature during the year 1949

Perineal burns are often only part of an extensive lesion which a few years ago was usually fatal, now with improved methods of resuscitation and early skin grafting the patient frequently survives and presents the surgeon with a reconstructive problem

The death rate from phagedena has shown a similar decline following the use of wide spectrum antibiotics The mortality figures for Fournier's gangrene are representative and have improved from 30 per cent in 1945 (Mair[4]) to 7 per cent in 1954 (Campbell[5])

SUGGESTED METHODS OF REPAIR

In 1924 Cottle[6] treated a complete avulsion of the left testicle and the skin of the penis and scrotum by implanting the right testicle beneath the skin of the right thigh and covering the shaft of the penis with a full thickness skin flap from the left inguinal region The urinary stream was diverted by an external urethrotomy Later the penis was freed in two stages The whole reconstruction required three operations and the testicle remained in an unnatural position (Fig 361a)

In 1929 Counseller and Palmer[7] treated a complete avulsion of the skin of the penis and the anterior two thirds of the skin of the scrotum Twenty-eight days were spent in obtaining healthy granulative tissue and then several Thiersch grafts were applied These were successful and the patient was discharged 54 days after the accident with a supple penile and scrotal covering (Fig 361b)

A fresh wound is preferable to granulation tissue for grafting and immediate skin coverage would have probably shortened the period in hospital

In 1938 Owens[1] treated a skin defect extending from the corona to the symphysis and involving the entire dorsum of the penis following cellulitis from a non-specific urethritis On the thirty-seventh day he raised a bridge flap on the anterior surface of the scrotum and passed the penis beneath the tunnel so that the raw area on the dorsum was covered with scrotal skin The edges of the flap were sutured to the corona and the base of the penis respectively The pedicles were later divided in two stages

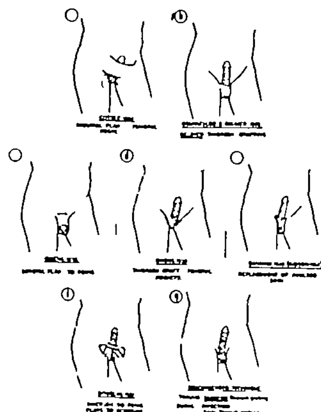


FIG 361 Diagram of penile and scrotal repairs

and the patient was discharged from hospital on the hundred and twenty first day (Fig 361c)

Owens was not satisfied with this repair because the transplanted skin was too thick and not pliable. He recommended using a half thickness skin graft and did so in his next case when a penile and scrotal skin avulsion was treated by covering the shaft of the penis with half thickness skin grafts which were sutured to the wound edges while each testicle was inserted into a subcutaneous pocket formed on the medial side of each thigh. The grafting was successful and the testicular pouches healed without infection (Fig 361d) He intended making a new scrotum but the patient refused operation When seen two years later there was no disturbance of physiological functions.

In 1949 Banham [2] used scrotal skin remnants to form a small scrotum after a total denudation and then used a flap from the right iliac region to cover the penile shaft. The urinary stream was diverted by a suprapubic catheter which was removed on the eighty third day The fistula closed rapidly The resulting skin was of good texture though there was some scarring along the ventral suture line causing the penis to bend to the right Erections were complete and painless. The patient was unmarried. Treatment entailed three operations and a suprapubic cystostomy

Banham also reported three other traumatic cases when the avulsed skin was used as a free graft. Small areas became necrotic and the sloughs required excision and replacement by Thiersch grafts The final results were satisfactory

Gibson [8] also repaired a complete genital denudation by excising all the damaged tissue and replacing the avulsed skin after it had been thinned to Wolfe graft thickness, which caused the detached scrotal skin to lose its wrinkled appearance and to become twice its normal size though it retained its bag shape. He immobilised the legs in the lithotomy position with plaster of Paris and maintained catheter drainage for nineteen days Stilboestrol was used to prevent erections and sulphathiazole was given as a prophylactic against urinary infection. About one-third of the graft on the scrotum and a small area on the penis died On the sixteenth day the sloughs were excised and replaced by stamp grafts Three months later the appearance of the area was nearly normal and sexual potency was unimpaired

The use of grafts cut under atraumatic conditions seems preferable to replacing traumatized skin of doubtful viability It is recognized that the re-application of battered skin after degloving injuries of the limbs is often unsatisfactory and it is usually better to excise all doubtful tissue and fill the defects with a split skin graft It would appear that the same principle should be applied to denuded genital organs

In 1951 Douglas [6] repaired a complete traumatic denudation by raising flaps of skin with a distal pedicle from the inner side of both thighs and rotated them medially to form a new scrotum. The shaft of the penis was covered with a split skin graft which was anchored proximally to a collar of full thickness skin obtained by raising a bridge flap from the pubic area and displacing it below the penis. The upper edge of the scrotal flaps were also fastened to this collar (Fig. 361f)

This procedure has the merit of being performed in one operation but it is a formidable undertaking in an ill patient who may have additional injuries and it would not be applicable to cases following gangrene or burns.

All these methods appear to be over-elaborate Simple split skin grafts applied to the penis and the scrotum, without surgical diversion of the urinary stream, and without complicated methods of immobilisation and bandaging have given satisfactory results in cases arising from trauma, gangrene, ex travasation of urine and burns A standard technique appears to be applicable to all types of penile and scrotal skin loss (Fig 361g)

1 Traumatic denudations should be covered with split skin grafts in the first few hours

2 Infective denudations should be grafted as soon as there is sign of epithelial regeneration from the edges of the wound

3 Burn denudations should be grafted as soon as the extent of full thickness skin destruction can be determined This is usually about the nineteenth day

Infective Denudation

Case I On 5 3 53 H W W (aged 48) was admitted to hospital with a swollen penis and a scrotum which was nearly black in colour and oozing a blood stained fluid, which contained a coagulase positive staphylococcus aureus sensitive to penicillin He began a course of crystalline penicillin and sulphamezathine

On 9 3 53 his buttucks were blistered and excoriated The scrotal slough turned green and a second wound swab showed contamination with B pyocyaneus and streptococcus faecalis The original staphylococcus was also present

By 19 3 53 the sloughs had separated and on 24 3 53 he was transferred to the Plastic Unit He began having daily saline baths Fig 362A shows the condition of his perineum at that time

On 30 3 53 a thick split skin graft was cut from the thigh and punctured in several places with a scalpel The graft was then wrapped round the shaft of the penis and stitched to the edges of the wound

The testicles were covered with three thin split skin grafts which were anchored with a few fine stitches The skin of the perineum was drawn together with heavy tension sutures and a rubber drain was inserted beneath the undermined edges

The penis, scrotum and perineum were covered with a light dressing of tulle gras, acriflavine and paraffin cotton wool, followed by white cotton wool which was held in position with a T bandage A course of sulphamezathine was given post-operatively for seven days

Fig 362B was taken at the first dressing on the seventh day (6 4 53) The percentage take of the scrotal area was only about 70 per cent, and a wound swab showed a profuse mixed infection of B pyocyaneus, coliforms, staphylococcus aureus and diphtheroids In spite of this the area healed in rapidly and no further grafting was required

Unfortunately he developed a bilateral thrombophlebitis of both calves and this delayed his discharge from hospital until 26 5 53 (86 days)

Fig 362 C and D shows the penile and scrotal condition a year later (8 5 54) The scrotal skin was very soft and freely mobile over the testicles The penile covering was not quite so elastic, but allowed erection to occur, though this caused a tight feeling He had not had sexual intercourse because he was frightened of hurting himself Micturition was normal

Case II On 28 4 50 A B aged 26, started driving a heavy vehicle That evening his thighs, penis and scrotum were red and sore During the next two days they became infected and he was admitted to hospital on 1 5 50 with a cellulitis of the penis and scrotum In spite of systemic sulphathiazole and daily saline baths an area of penile and scrotal skin became necrotic

On 19 5 50 (22nd day) he was transferred to the Plastic Unit (Fig 363 A and B) A wound swab contained scanty gram positive cocci and culture showed coliform B pyocyaneus and diphtheroids which were not penicillin or streptomycin sensitive

On 22 5 50 (25th day) a thick split skin graft was taken from the thigh and punctured in several places with a scalpel and sewn to the wound edges to fill the defect The penis was immobilised by a heavy silk thread passed through the glans and attached to a crammer wire splint incorporated in a plaster of paris belt which was placed around the abdomen The shaft of the penis was packed with flavine wool and a pressure dressing applied (this elaborate method of immobilization proved to be unnecessary in later cases)

Erections were controlled by Stilboestrol and pot brom and chloral The whole graft survived, and he was discharged home twenty-five

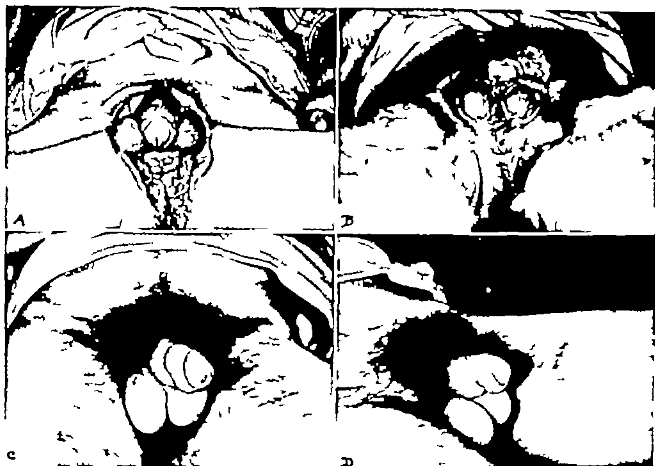


FIG. 362. (H W W) A Penis and scrotum after separation of sloughs B Appearance 7 days after grafting. C and D 1 year later

days after operation (16.5.50) (Fig. 363 C and D)

A year later 12.5.54 (Fig 363 E and F) the penile graft was a little thicker than the normal penile skin and white in colour There was no difficulty with erection or sexual intercourse and sensation was normal. The portion of the graft extending onto the scrotum was not white, and was so similar to the surrounding native skin that it was difficult to tell where one began and the other ended.

Why the same graft behaved differently in the adjacent regions is unexplained.

Case III On 11.3.53 R. G aged 34 fell across a metal tube injuring his scrotum He passed urine after the accident and was taken home

On 13.3.53 (3rd day) he was admitted to hospital with the left testicle enlarged and tender The scrotum was hot and painful and he passed very small amounts of urine Within three hours the penis became grossly swollen and the lower abdomen was very tender The scrotum was drained and a rupture of the urethra found. A suprapubic cystostomy was performed

On 17.4.53 (25th day) he was transferred to the Plastic Unit with an extensive loss of skin on the shaft of the penis (Fig 364 A and B) Coliform bacilli B pyocyaneus and staphylococcus aureus were isolated from a wound swab All the organisms were sensitive to sulphamezathine.

He started daily saline baths and a thin pellicle of epithelium appeared at the edge of the wound

On 20.5.53 (40th day) a thin split skin graft was applied to the granulation tissue and anchored with a few sutures (Fig 364C) The penis was extended and held in position with a thick silk suture passed through the glans and attached to a crammer wire bridge which was fastened to the thighs with strapping A pressure dressing around the penile shaft was held in position with a crepe bandage He was given a course of sulphamezathine postoperatively together with Stilboestrol and potassium bromide to prevent erections.



FIG 363 (A.B) A and B Condition after separation of slough C and D Condition 25 days after grafting E and F Condition 4 years later

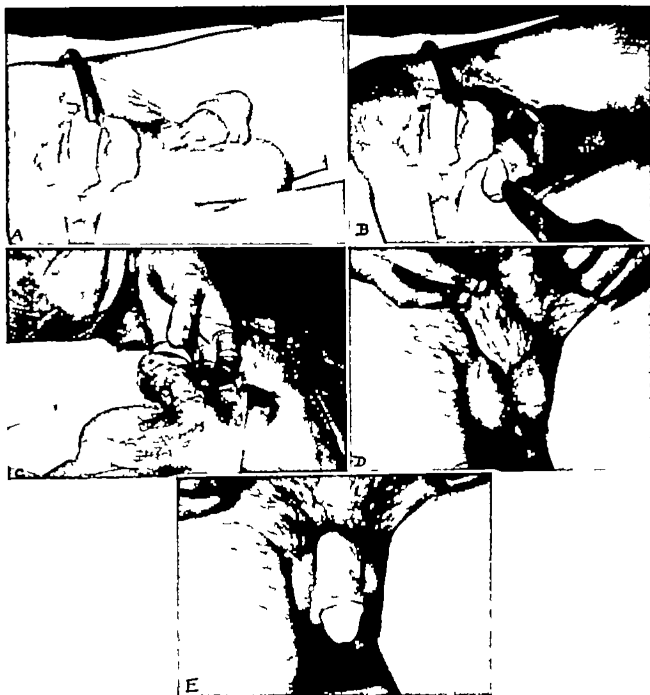


FIG. 364. (R.G.) A. and B. Condition after separation of slough. C. Skin graft sutured into defect (photo during operation). D. and E. Condition 1 year later.

At the first dressing 90 per cent of the graft had survived. The small area of failure healed rapidly. He left the Unit on 14.6.53 (65th day).

When seen a year later on 12.5.54 the graft was soft, elastic and mobile and almost the same colour as the native skin (Fig. 364 D and E). Micturition and marital relationships were normal.

Case IV. G. K. aged 35 worked with pitch products and developed scrotal warts. These were treated with diathermy but unfortunately extensive scrotal gangrene developed (Fig. 365A). Skin grafts were applied on the 22nd day of the illness and Fig. 365B shows the type of dressing used. Convalescence was uneventful and he was discharged home on the 43rd day (19 days after grafting Fig. 365C).

It should be stressed that in all these cases the grafts took successfully in spite of heavy mixed bacterial infections and that an initial take of

about 70 per cent will provide adequate cover

It also appears that the thinner the graft the better the final result

Barret Brown[10] published a report of a patient suffering from granuloma inguinale with genital ulceration which had failed to heal under medical and X-ray treatment The ulcers were destroyed over a wide area with a cautery and allowed to granulate Two crops of thick split skin grafts were then used to cover the defect Eventually the lesions healed

He also reported two cases of complete recovery of sensation and function after the use of grafts to repair the total loss of penile skin following circumcision

Traumatic Denudation

Case V A three-day-old child was admitted to a plastic unit with a total avulsion of the scrotal skin following a forceps delivery Under general anaesthesia the raw area was covered with a split skin graft which was sutured to the edges of the wound A light pressure dressing was applied and held in position with a T band-



Fig 365 (G K) A Scrotum after separation of sloughs B Graft in position at the end of the operation C The dressing used after operation D Condition 19 days after grafting E Condition 7 months after grafting

age Most of the graft was living at the first dressing When the child was seen five years later the scrotum was nearly normal in appearance and contained two small swellings which appeared to be testicles

No elaborate immobilisation of the dressing was required

(I am indebted to a colleague for this history)

DENUDATION AFTER SCALDS AND BURNING

In these lesions the use of grafts is undisputed since the neighbouring skin is usually involved and unsuitable for use in a repair by flap techniques

When the area of full thickness skin destruction is clearly defined the sloughs should be excised and the raw area covered with closely fitting "stamp grafts" on the scrotum and punctured skin grafts on the penile shaft

Case 11 On 21.9.52 D L an 8 year-old boy was injured when a lighted firework exploded in his pocket Both thighs the lower abdomen the penis and scrotum were severely burnt. Penicillin cream and tulle gras pressure dressings were applied locally and he was given intramuscular injections of procaine penicillin (300,000 units daily)

On 20.9.52 he was transferred to the Plastic Unit His general condition was good and his blood haemoglobin was 95 per cent. He was placed in a saline bath on alternate days

On 7 10.52 (15th day) stamp grafts were applied to the scrotum and inguinal areas after excision of the sloughs (Fig 366A) A punctured sheet of skin was placed round the shaft of the penis and sewn distally to the glans near the urethral meatus Proximally it was anchored to subcutaneous tissue in the pubic area. The penis was then wrapped around with vaseline gauze and the scrotum covered with tulle gras acriflavine wool and a T bandage

On 27 10.52 (35th day) the penis and scrotum were completely covered with epithelium. Further skin grafts were applied to granulating areas on the abdomen and thighs

On 12.11.52 (51st day) further skin grafts were applied to the inner sides of both thighs. The grafts were bandaged and then plaster slabs were placed along the front of the thighs



FIG. 366 (D.L.) A. A few minutes before removal of sloughs and grafting. B Two and one half months after grafting. C Nineteen months after grafting

and joined across the abdomen to restrict movement.

On 23 12 52 (92nd day) he was discharged home (Fig 366B)

As the months passed the burnt areas on the abdomen and thighs became extremely scarred, while the penile and scrotal skin remained soft and supple (Fig 366C)

This case raises an important question Why did the genital area remain unaffected by hypertrophic scar, when the surrounding skin became so markedly involved? The same phenomenon has been noted in other cases not reported in this paper

It appears that the male genital region possesses the power of healing with minimal scar formation—circumcision is never followed by keloid or hypertrophic scars, and this is not the result of a horizontal incision lying along a Langer's line because longitudinally placed incisions in hypospadias repairs are equally free from fibrosis Rapid epithelization and regrowth of skin is a second characteristic of the penis and scrotum

Case VII (Mr J D T Jones' case) A man of 74 was admitted with a very painful ten-day-old swelling of the scrotum During the next three days a spreading gangrenous patch appeared (Fig 367A) It reached the membranous layer of the superficial fascia and undermined the skin edges for a considerable distance Under general anaesthesia the slough was excised and the wound was irrigated with hydrogen peroxide containing ten times its volume of oxygen, then it was packed with a zinc peroxide paste As there was no improvement in three days, an aqueous solution of 0 5 mgm per ml of Tyrothrycin was applied as a wet dressing Within 48 hours the whole area was clean and granulating (Fig 367B) Daily ultraviolet light was used to stimulate healing Three weeks after the first operation a second was performed when the testicles were pushed up to the external inguinal ring and held there The scrotal remnants were then stitched together During the next few days part of the wound broke down and was re-sutured

The result a year later is shown in Fig 367C In spite of infection and the breakdown of the suture line, the scrotal scar was pliable and thin and the scrotum was normal in shape and size

Other cases reported in the literature show the same extraordinary powers of regeneration

Wetherall[11] used continuous traction on remnants of scrotal skin in a denudation following infection in a herniorraphy incision At the end of three weeks he was able to close the wound in spite of extensive skin loss

Ehrill and O'Donaghue[12] reported a case of scrotal gangrene which was dramatically ar-

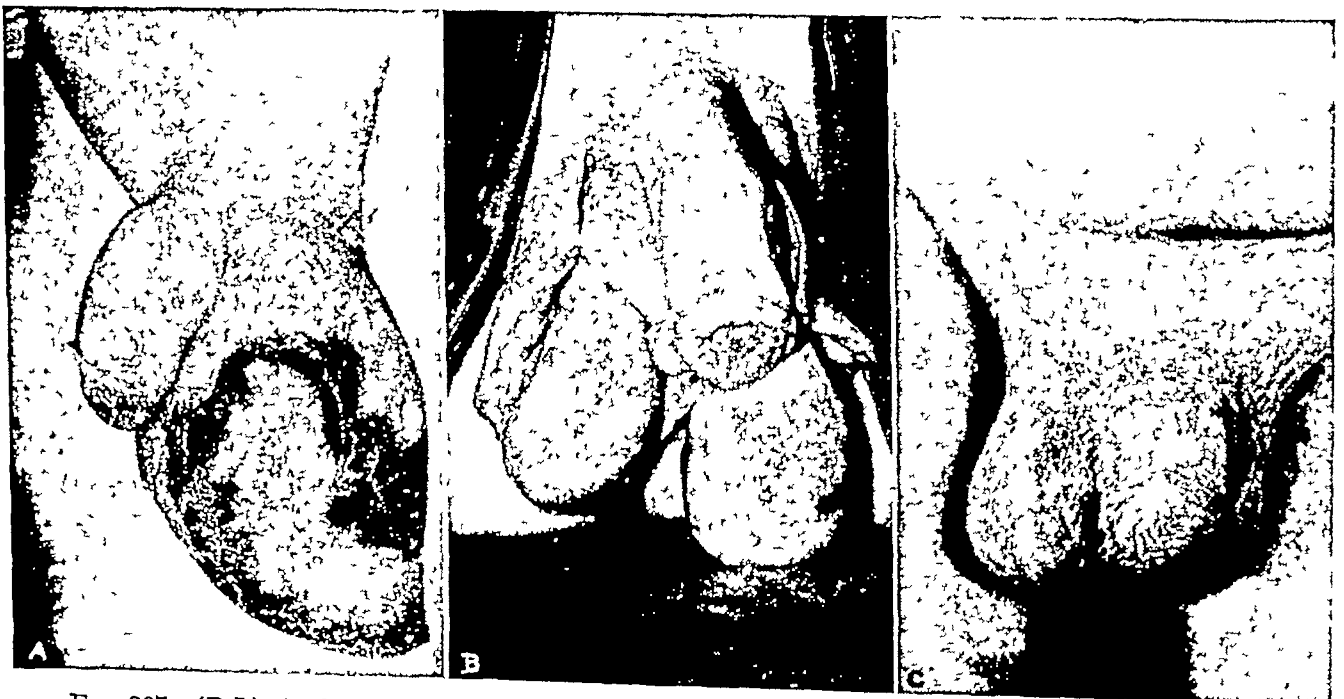


Fig 367 (P J) A Gangrenous sloughs of scrotal skin B After excision of slough and application of Tyrothrycin for 48 hours C 1 year later

rested by penicillin A wide area of skin loss was left to heal by cicatrization. The result shown in their final photograph is quite satisfactory

Gibb[13] in 1855—exactly one hundred years ago—published what is probably the first report of a traumatic denudation of male genital skin Henry a negro suffered an avulsion of the left testicle and cord and the skin of the penis and scrotum by a factory shaft The perineum was sutured and the remainder of the wound healed by granulation and cicatrization He resumed work in less than four months and he stated that although his penis was short coitus produced full satisfaction Few other areas of the body would have healed as quickly or as well.

Discussion

These cases suggest that the male genital area has two important properties that should influence our choice of method in repairing skin losses in this region

(1) An unusually rapid proliferation of epithelial cells will cover raw areas arising from the edges of the native skin and grafts alike and will proceed even in the presence of considerable mixed infection Thus only a moderate initial take provides a satisfactory result

(2) There is a minimal formation of scar tissue in this area a statement supported by the excellent cosmetic scars of varicocele hydrocele and vasectomy operation which often become almost invisible

Less important to the present subject of repair but each worthy of note are the reactions of scrotal skin to

a Constant wetting by ammoniacal urine in chronic urinary incontinence It undergoes elephantine thickening whereas the neighbouring skin of the thighs becomes sodden and infected.

b Flexural seborrhoeic dermatitis affects the skin of the groins while the scrotal skin immediately adjacent is unaffected

c. Conversely an hour or so after touching primula, poison ivy or other sensitising agent with any part of the body a crop of minute vesicles on an erythematous base may develop in the skin of the scrotum in sensitive individuals, followed by marked oedema of the part (Roxburgh[14])

Thus it appears that penile and scrotal skin differs in several respects from skin elsewhere and these qualities make free skin grafting the method of choice in repairing denudations.

Summary

1 A short review is presented of classical methods of penile and scrotal skin repair

2 New clinical material is examined and peculiar characteristics of male genital skin is observed

3 The use of split skin grafts is recommended for the repair of penile and scrotal skin loss irrespective of its aetiology

Acknowledgments

I wish to thank Mr Fenton Braithwaite and Professor A G R Lowdon for suggestions and criticism in the preparation of this paper Mr J D T Jones for permission to publish one of his cases and Mr J C Campbell Mr F I Herbert, Mr J R. G Edwards and Dr W V Macfarlane for helpful advice

20 Linden Road Gosforth,
Newcastle-on Tyne 3 England

References

1 Owens N Surgery 12 88-96 1942.
2 Banham, A R Brit J Surg 36 143, 263 1949
3 Baxter H Plastic & Reconstructive Surgery 4 508-521 1949 Quoted by F L. Hutter N Z med J., 50 485-487 1951
4 Mair B B Lancet I 464-466 1945
5 Campbell J C Brit. J Urol 27 2 106-113 1955
6 Cottle G F U S Navy Medical Bull 20 457 (Quoted by Counseller & Palmer (C7)
7 Counseller V S., and Palmer B M Surg. Clin. N America 9 993 1929
8 Gibson, T Brit J Plast Surg., 6 4 283 1954
9 Douglas B Ann Surg., 133 889 1951
10 Brown J B Surg Gynec. & Obstet., 65 302 1937
11 Wetherell F S. Surgery 18 525-527 1945
12 Ehrill, D., and O'Donoghue M Brit. J Urol 23 56-59 1951.
13 Gibb R. W Charleston Med. J & Res., 10 145 1855 (Quoted by N Owens (1))
14 Roxburgh A. C "Common Skin Diseases, 4th Edit. p 79 London H. K. Lewis & Co., 1937

Reparation de la Peau du Penis et du Scrotum.
Robert Charles Bell.

La peau de la zone génitale chez l'homme est douée d un pouvoir rare de guérison l'épithélialisation y est plus rapide qu ailleurs et la formation de tissu superficiel est minime on ne connait

pratiquement pas de cicatrice hypertrophique après circoncision

Des greffes cutanées par dédoublement donnent des résultats satisfaisants dans les cas de mise à nu du pénis et du scrotum à la suite d'une avulsion traumatique, d'une infection ound-une brûlure

La réparation à l'aide d'une technique par lambeau requiert trop de travail et trop de temps et le résultat final est souvent inférieur à celui obtenu par le procédé beaucoup plus facile et plus rapide qui consiste à utiliser des greffes dermo-épidermiques L'auteur recommande chaleureusement cette méthode

Ersatz der Haut des Penis und des Scrotum.
ROBERT CHARLES BELL

Die Haut der mannlichen Genitalregion hat ungewohnlich gute Heilungsfahigkeiten Die Epithelisierung erfolgt viel schneller als irgendwoanders und die Narbenbildung ist minimal Hypertrophische Narben nach Beschneidung sind tatsachlich unbekannt

Spalthauttransplantate bieten die Moglichkeit zum befriedigenden Hautersatz bei Entblossung des Penis und des Scrotum nach traumatischer Ablederung, Infektion oder Verbrennung Die Wiederherstellung mit gestieltem Hautlappen ist ausserst muhsam und zeitraubend, und das Endresultat ist haufig demjenigen unterlegen, das mit dem viel einfacheren und schnelleren Verfahren der Spalthauttransplantation erreicht werden kann Letztere Methode wird dringend empfohlen

Reparación de la Piel del Pene y del Escroto.
ROBERT CHARLES BELL

La piel del área genital masculina tiene un gran poder de cicatrización, la epitelización es mas rápida que en otros lados y la formación de tejido cicatricial es mínima (la cicatriz hipertrófica despues de la circuncisión es virtualmente desconocida)

Los injertos de medio espesor de piel dan una reparación satisfactoria en la denudación del pene y escroto despues de avulsión traumática, infección o quemadura

La reparación con la técnica de colgajo esta "sobre elaborada" y, el tiempo consumido y los resultados finales resultan inferiores a los obtenidos con el injerto Este método es fuertemente recomendado

---

Reconstruction of the Penile Skin by Split Skin Grafts with Special Reference to Elephantiasic Conditions.

HEINZ GELBKE, Dr med , Priv -Dozent
From the University Surgical Clinic, Gottingen, Germany

Elephantiasic diseases of the penis and scrotum are not very frequent Therefore, perhaps you will allow me to describe our experiences of successfully treated cases The causes of the condition, mostly lymphatic stoppages following chronic inflammations, erysipelas, eczema, etc will not be entered into in this connection Only the operative therapy will be discussed here

In our opinion, the only rational treatment is the total excision of the degenerated skin and of the subdermic cellular tissue of the body of the penis, and the reduction of the scrotum by partial resection, if necessary in connection with extirpation of the elephantiasic subcutaneous tissue in the remaining part of the scrotum

Only the split skin graft should serve to replace the penile skin First of all, the superiority of the split skin graft will be emphasized by citing the following

Case 1 (Fig 368) A twenty-year-old miner suffered from a condition following the scalping of his penis by borer injury First aid was rendered in another hospital by applying Reverdin pinch grafts

The cosmetic and functional results were absolutely insufficient The secondary epithelization of the granulating wound surfaces remaining between the Reverdin pinch grafts led to a penis stricture looking like a napkin-ring, connected with oedematous swelling of the prepuce, as well as to retraction of the penis between the pubic arches The Reverdin pinch grafts and the secondary epithelium had to be removed by excision The skinned penis was covered by a split skin graft The functional and cosmetic results were satisfactory in every respect after

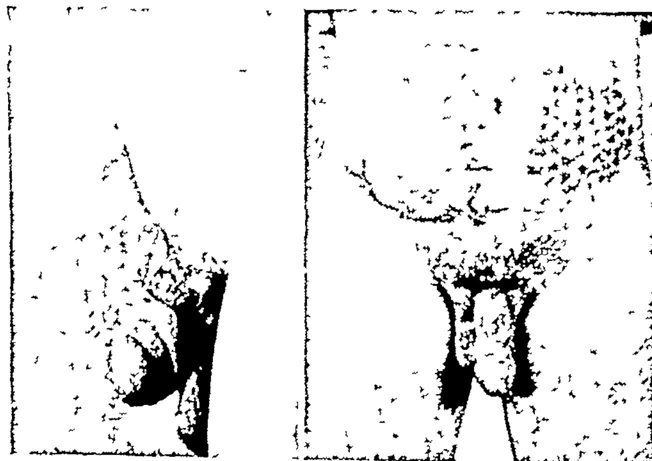


FIG 368 (Case 1) (A, left) Condition after treatment by Reverdin pinch grafts elsewhere of a case of penile scalping by borer injury (B, right) Result after replacing the Reverdin skin by split-skin-graft

a smooth healing process Full sexual activity has now been rendered possible. You are therefore urgently advised not to use Reverdin punch grafts to replace the skin of the body of the penis.

Three cases of elephantiasic penis et scroti will be described here In each case the body of the penis was completely skinned down to the tunica albuginea, and the scrotum was partially resected The penile skin was substituted by a split skin graft which had been removed with a Padgett dermatome In each case the healing proceeded on the whole without complications The result was always a mobile corpus penis epiderm. Normal sexual activity was again possible soon after the plastic operation Only in the last case there was a finger-size skin necrosis on the back of the penis and a small urethral fistula in the region of the sulcus coronarius probably as a result of pressure of the bandage The technique of the dressing which plays an important part in the success of the operation will be described in detail later on.

Case 2 (Fig 369) A forty year-old carpenter had an elephantiasic penis et scroti for 3 years obviously as a result of a chronic occupational eczema (handling of turpentine colours) All dermatological and other attempts at conservative treatment had failed. The whole penile skin was removed and the lower two thirds of the scrotum were resected. The scrotum was sewn up under temporary drainage and the corpus penis covered with a split skin graft

As in every case of free skin grafting, immobilization of the region of the graft and a steadily soft pressure must also be provided here. The latter is difficult to achieve in the case of the penis owing to its frequent changes of size A reliable application of the bandage is attained according to our experiences by the following method

A medium-sized catheter is entered It serves on the one hand as a urinary passage and on the other hand as a certain support of the penis The split skin graft is dressed with gauze containing penicillin or terramycin ointment. A cellulose tissue layer follows Next follows a wrapping with soft sponge rubber which is fastened with broad adhesive plaster Some support and immobilization of the penis is thus achieved and the split skin graft is exposed to steady pressure Although the bandaging causes a permanent semi-erection of the penis, we have never experienced thrombosis, priapism or other complications The dressing remains untouched for ten days The drains of the scrotum are removed after one or two days

Healing followed without complications Four weeks after the operation the patient was discharged to his home.

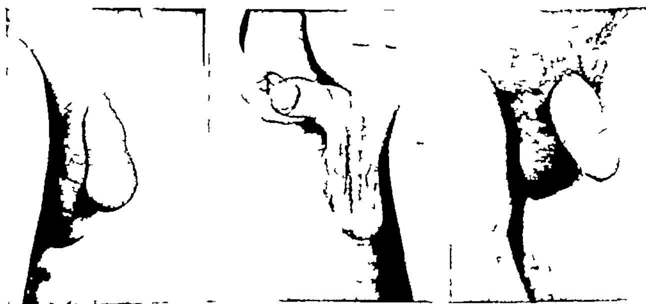


Fig 369 (Case 2.) (A, left B center) Original condition of elephantiasis. (C right) Result of treatment as described.



Fig 370 (Case 3) (A, left) Original condition (B, center, C, right) Result one year after surgical treatment

Case 3 (Fig 370) A thirty-year-old physician with an elephantiasic penis et scroti resulting from an inflammation resembling an erysipelas All attempts at conservative treatment had failed Condition during the last year was stationary The same operation was performed Good functional and cosmetic result followed Full sexual activity became possible, and there were no longer any psychic depressions

Case 4 (Fig 371) This 30-year-old workingman of poor intellect had a gigantic elephantiasic penis et scroti since his sixth year The scrotum reached almost down to his knees This man, married for some years, had not yet been capable of having any sexual intercourse The cause of this deviation is not known Eczema or chronic inflammation may, however, be assumed

Four fifths of the scrotum were resected It became then apparent that one testicle was missing which had evidently been removed during a former operation for inguinal hernia As in the other cases, the skin covering was supplied by a split skin graft from the abdomen At the time of his discharge from hospital he still had a small area of necrosis on the back of the penis, which was left for self-epithelization If necessary, the remaining scar may be subjected to a plastic correction He also has a small fistula of the urethra The patient, however, is highly satisfied with the cosmetic and functional result obtained so far

Three factors increase the chances of success for this operative procedure Firstly, the anti-infection protection through antibiotics, secondly, the fact that the skin graft can be correctly measured as to its thickness thanks to the mechanically cutting instruments (as for example the Padgett-Hood dermatome), and finally, a correct dressing technique

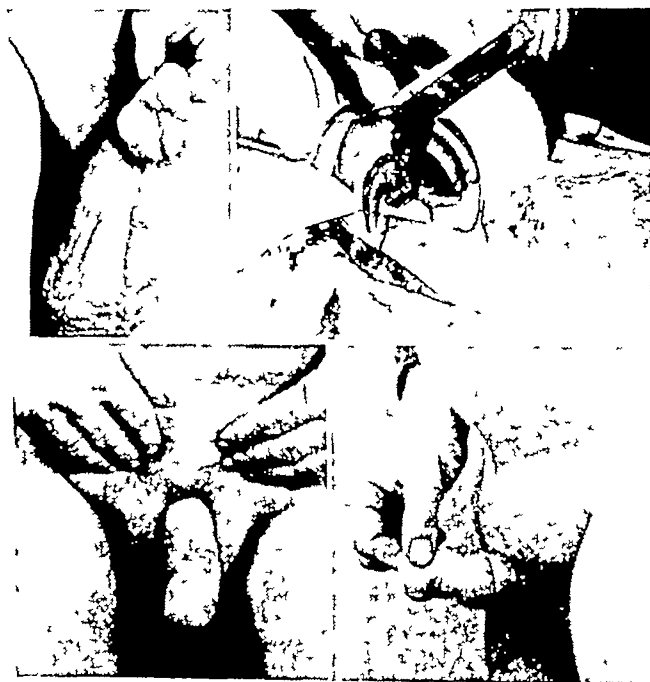


Fig 371 (Case 4) (A, top left) Original condition of extreme elephantiasis (B, top right) Showing the section of the skin graft with the dermatome Behind the dermatome is the denuded penis (C, lower left, D, lower right) Present condition A small area of necrosis of the grafted skin healed by self-epithelization Patient is satisfied

Réconstruction de la Peau du Pénis par des Greffes Dermoepidermiques en se Référant Particulièrement au cas d'Elephantiasis. HEINZ GELBKE.

Les mesures conservatrices étant généralement inefficaces dans les modifications éléphantiasiques des organes génitaux masculins le meilleur traitement et le plus sûr consiste en une excision partielle du scrotum et en une exérèse complète de la peau du pénis. A l'aide de 3 cas l'auteur montre que la meilleure restitution esthétique et fonctionnelle de la peau du pénis est constituée par des greffes cutanées d'épaisseur intermédiaire prélevées au dermatome. La supériorité de ce type de greffe est illustrée dans cas de traumatisme du pénis réparé une première fois par des greffes de Reverdin et qui une seconde fois, fut réparé par l'auteur selon la technique précédemment décrite.

Ersatz der Penishaut durch Spalthaut-lappentransplantation unter besonderer Berücksichtigung Elephantiasisartiger Zustände. HEINZ GELBKE.

Elephantiastische Veränderungen am männlichen Genitale können—bei meist erfolgloser konservativer Behandlung—am besten und sichersten durch verkleinernde Resektion des Skrotums und vollständige Entfernung der Penisschafthaut behandelt werden. An Hand von drei Fällen wird gezeigt, dass der kosmetisch und funktionell beste Ersatz der Penishaut der halbdicke frei transplantierte dermatom geschnittene Hautlappen ist. Die Überlegenheit dieses Transplantates wird an einer traumatischen Penisschindung gezeigt die ausserhalb mit Reverdinläppchen versorgt und hier sekundär nach obiger Technik korrigiert wurde.

Reconstrucción de la Piel del Pene con Injertos de Mediano Espesor, Haciendo Referencia Especial a las Condiciones de Elefantiasis. HEINZ GELBKE

Los cambios por elefantiasis de los genitales del hombre (cuando las medidas conservadoras generales son inefectivas) son tratados mejor y con mas seguridad por la excisión parcial del escroto y la remoción completa de la piel del pene. En tres casos se demuestra que la mejor restitución estética y functional para la piel del pene son los injertos de mediano espesor tomados con dermatomo. La superioridad de este tipo de injerto se demuestra en un pene traumatizado reparado previamente con injertos de Reverdin en el cual se efectuo despues la reparación de acuerdo con la técnica descrita.

B Female Genitals

The Treatment of Vaginal Atresia by Free Grafts. SIR ARCHIBALD MCINDOE *London England*

In 1937 I described an operation for the cure of congenital atresia of the vagina which has become standard practice in Great Britain and America. In 1950 I recorded the technique and end results in 63 cases. This present report brings this series up to date and records the ends results of 96 cases (some of which had been watched for 18 years). All of them have been dealt with by the same operator using the same technique, the only variation being concerned with the presence or absence of a functioning uterus. My gynecological colleague in the vast majority of these cases has been Mr Charles Read of the Chelsea Hospital for Women.

The principles of inlay grafting are now so well known that one need scarcely waste time outlining them beyond saying that before an inlay graft can hope to succeed.

(1) The cavity *must* be prepared with care. The walls being as far as possible clean, smooth healthy and dry and without non-viable tags which would not receive a graft.

(2) The skin graft must be carried on a mould which fits the cavity with great accuracy.

(3) This mould can be made before or during the operation—for vaginal grafting it is made before operation.

(4) The skin must be as thin as possible to avoid dermal appendages such as hair sweat and sebaceous glands.

(5) Dilatation must be continuous not intermittent, and must persist until *all* tendency to contraction is overcome.

This contractile phase is most marked in cavity grafts of thin skin and success or failure with this operation entirely depends on preventing contraction rather than attempting to cure it when it has occurred.

Five methods of cure for vaginal atresia have been proposed

(1) Simple pressure (Frank)

(2) Simple reconstruction over a balsa wood mould—no graft is used (Wharton)

(3) Pedunculated flaps (Graves, Frank and Geish)
(4) Intestinal transplantation (Baldwin (ilium) Schubert Popoff (rectum))
(5) Free grafts (McIndoe (Counseller))

Technique

The advantage of the free graft technique is its essential simplicity The operation need not take more than 20 minutes and on one occasion my colleague Mr Charles Read and I performed it on 6 cases in one operative list, surely a record in this field

A thin razor graft 25 x 6 cm is first taken from the inner side of the thigh It is important that this be in one piece and without holes or breaks in continuity The patient is then placed in the lithotomy position and the cavity prepared between bladder and rectum The dissection is blunt and is carried up to the Pouch of Douglas the easiest method being by lateral separation with the index fingers If the correct plane of cleavage is entered bleeding is slight and separation easy A trial fitting with a Manikin mould will determine whether it lies firmly and comfortably in the cavity, something which must of course be found out by trial and error

The real mould constructed of acrylic and weighing one ounce is now draped with the split skin graft so that it is completely covered except for the lower end It is then inserted carefully into the cavity and a perineal bridge constructed beneath it to keep the mould in position, leaving however the urethra free and sufficient space for drainage

In 4-6 months the mould is removed and graded dilators substituted The grafted cavity is treated like any other of its type in relation to losses of skin, granulomata and so forth The patient is encouraged to marry as soon as possible and to regard herself as a normal person

Analysis

Of the 96 patients, 82 showed complete congenital absence of the vagina The only trace of its presence being a small depression between the labia capable of admitting the finger tips for 1-2 cms at the most In 3 cases functioning uteri were present as shown by haematometra and pyometra—4 patients had septate vaginas, 2 single and 1 double, the former in the upper and lower thirds respectively, while the double septum occupied the middle third In 1 patient there was a fistulous track 8 cm long connecting a normal functioning uterus to the exterior The vagina was represented by a small depression just anterior to what was evidently a long cervical canal In the 3 patients with acquired strictures, one had a traumatic obstetrical stricture at the cervical end of the canal and one an obliterative vaginitis due to inflammation One case of atresia followed a vaginal hysterectomy in a woman of 43 In 6 of these cases functioning uteri were present Thus in 96 cases there were 9 functioning uteri In all, complete restoration of utero-vaginal continuity was carried out, the uterus preserved, menstruation established, and pregnancy has followed six times In all, Caesarean section has been necessary

It is impossible to say how many non-functioning or rudimentary uteri were present, though undoubtedly many were

It can be seen, therefore, that complete congenital absence of the vagina associated with normal external genitalia and absent uterus, but with ovarian tissue present, is by far the most common condition A functioning uterus, even double, may be present but is rare The less the degree of artesia, as evidenced by septate formation, the greater the likelihood of a functioning uterus being present

The youngest patient was 13, the oldest 43 In the young at puberty the condition was usually discovered on account of haematometra and a presenting abdominal tumour Later persistent amenorrhoea or abortive monthly cramps impelled examination while, in some, marriage with inability to have intercourse brought the patient to the doctor 24 patients had married in ignorance of the physical defects, while 2 were discontentedly existing in that condition five or fifteen years respectively before it began to dawn on themselves or their husbands that something was wrong By far the majority fall into the age group 18 to 24, when marriage is contemplated, and the method by which the condition is first discovered is often more of sociological than scientific interest

Post-operative examination and follow up of all patients operated on during this eighteen year period gives the following results

(1) An excellent result is classed as one in which the vagina measures 12 x 3 cm and where

normal intercourse is or should be possible. 81 patients satisfied these conditions. In these—usually of a high grade of intelligence—the mould had been retained well over the contractile phase and further care had been taken by intermittent dilatation to prevent contraction until marriage

(2) A satisfactory result is classed as one in which the vagina measures 7 to 12 by 3 cm and where intercourse is satisfactory but there is mild complaint of shortness There were 10 patients in this group Shortness was due to lack of co-operation, to removing the mould before the period of contraction was over to haematoma formation and consequent loss of graft, or to infection producing the same result The most important factor was undoubtedly too early removal of the mould.

(3) A poor result is classed as one in which contraction is so severe that the vagina measures less than 7 cm in length and in which intercourse is unsatisfactory for either partner There were 4 patients in this group Most of them were of low intelligence and had entirely failed to co-operate during the post-operative treatment They were either of the shrinking violet variety and thought the whole affair rude or the even more sensitive who "just couldn t stand it at all" Consequently they lost no opportunity of avoiding the use of the mould.

(4) Failure occurred three times One patient removed the mould and discharged herself from hospital. Complete contraction followed Interestingly enough she has returned after four years with a strong wish to go through the operation again. She was engaged to be married at the time of the first operation and had fallen out with her fiance In order to carry her point with him she had intentionally made the operation fail She is *now engaged for the second* time but is four years older and wiser Two others failed for technical reasons The mould was discharged per rectum owing to excessive pressure and ulceration of the rectovaginal septum. Curiously enough both fistulae contracted down rapidly and have not given trouble. The vaginal cavities have also contracted. It should be quite possible to re-operate on these 3 patients with a good chance of success.

Thus in this series of 96 patients 83 per cent obtained excellent results while only 3 per cent failed There was no mortality, and the actual period of hospitalisation did not exceed three weeks. The morbidity was low being confined to those cases in which a mild degree of pelvic cellulitis or perivaginal inflammation occurred. These results agree with those reported by Counseller of the Mayo Clinic who in 70 patients treated in this way reports excellent results in 80 per cent and failure in 7 per cent for the same reasons which I have encountered.

Summary and Conclusions

Utilising modern plastic principles of inlay grafting and continuous dilatation until the contractile phase is over it is possible to construct an entirely satisfactory vagina with a high percentage of success (83 per cent) and low rate of failure (3 per cent) without danger to life and with low morbidity From the gynecological standpoint the *functional effect cannot* be obtained by any other procedure so easily

149 Harley Street
London W.1 England

Le Traitement de l Atrésie Vaginale par les Greffes Libres. Sir Archibald McIndoe.

L'auteur *décrit son opération* pour l'absence congénitale devagin. Elle consiste essentiellement à tapisser une cavité de taille convenable créée entre le rectum et la vessie d'une greffe cutanée mince qui est maintenue en place par un moule léger en acrylic que l on laisse pendant 4 mois

Le moule est enlevé au bout de ce temps et on lui substitue un dilatateur temporaire amovible

L auteur présente les résultats terminaux de 96 cas tous traités par cette technique et suivis pendant une période de 13 ans Dans 83% des cas les résultats furent excellents et il n y eut que 3% d échecs Pas de mortalité opératoire et la période d'hospitalisation réelle n'a pas dépassé 3 semaines. Morbidité faible limitée aux cas présentant un léger degré de cellulite pelvienne ou de l'inflammation périvaginale

Du point de vue gynécologique il n est pas possible d obtenir avec un autre procédé un résultat fonctionnel aussi facile et aussi satisfaisant

Behandlung der Vaginalen Atresie mit Freier Transplantation. Sir Archibald McIndoe.

Der Verfasser beschreibt seine Operationsmethode bei angeborenem Fehlen der Vagina. Diese besteht im wesentlichen darin dass eine Höhle von angemessener Grösse zwischen dem Rectum und der Blase mit einem dünnen Haut transplantat ausgelegt wird das vier Monate lang

mit einer leichten Kunstharzform am Platz gehalten wird

Nach dieser Zeitspanne wird die Form entfernt, und durch einen zeitweilig herausnehmbaren Dilatator ersetzt Der Verfasser fuhrt die Endergebnisse von 96 Fallen vor, die alle mit dieser Methode behandelt und uber einen Zeitraum von 13 Jahren beobachtet wurden In dieser Serie wurden in 83 Fallen ausgezeichnete Ergebnisse erzielt, nur 3% waren erfolglos Es gab keine Todesfalle, und der Krankenhausaufenthalt war nicht langer als drei Wochen Die Komplikationsfrequenz war niedrig, beschrankte sich auf die Falle, in denen ein geringer Grad von Beckenphlegmonen oder perivaginaler Entzundung auftrat

Vom gynakologischen Standpunkt kann mit keiner anderen Methode das funktionelle Ergebnis so leicht und so zufriedenstellend erreicht werden

Tratamiento de la Atresia Vaginal, Mediante Injertos. Sir Archibald McIndoe

El autor describe su operación para la ausencia congénita de la vagina Consiste esencialmente en la formación de una cavidad de tamaño apropiado entre el recto y la vejiga, tapizándola con un injerto delgado que es detenido en su posición mediante un molde de acrílico, aplicado en sitio durante cuatro meses

Después de éste período el molde se retira colocándose en su lugar un dilatador removible

El autor presenta el resultado final de 96 casos, tratados todos ellos con ésta técnica y observados por un período de 13 años En ésta serie el 83% obtuvieron buenos resultados, fallando sólamente un 3% No hubo mortalidad y el período actual de hospitalización no excede de 3 semanas

Las complicaciones fueron raras, constituídas por algunos casos de celulitis pélvica o inflamación peri-vaginal

Desde el punto de vista ginecológico no puede obtenerse un resultado tan sencillo y satisfactorio con ninguna otra técnica

---

A Safer Technique for Vaginal Construction by Free Skin Graft.

George S Polycratis, M D, *Plastic Surgery Dept, Laikon Hospital, University, Athens, Greece*

In 1952 when I first began to see patients with congenital absence of the vagina, I began to think of the best method of fixation and immobilization of the skin graft lining the artificial cavity

Insertion of the skin graft on molds constructed of different hard materials like acrylic, dental stent, pyrex glass, balsa wood, etc , seemed to me to be fraught with rare but serious danger of damage by hard and undue pressure on the rectum and bladder by these materials

Another disadvantage of these hard materials is the impossibility of securing an absolute and complete immobilization, because small movements or reflex contractures of the perineum transmitted to the mold and to the skin graft may result in an unsuccessful take of the skin, of varying extent Under these circumstances I decided to immobilize the skin graft with the usual dressing, i e a mass of gauze after covering the graft with an antiseptic ointment This technique faced two difficulties (1) How to insert the skin graft into the artificial pocket to give it the shape and size of a normal vagina (2) How to insert the gauze packing and place it in contact with all parts of the skin graft without wrinkling or displacing the graft in the depths of the vagina

To overcome these two difficulties I employed a medium-sized simple proctoscope, 12 cm in length and 3 5 cm in diameter (Fig 372, left), around which was wrapped a piece of skin graft 30 x 10 cm in dimensions, with the raw surface out The free edges of the skin graft were united with a continuous fine black silk suture to form a sac corresponding to the size and shape of the vagina (Fig 372, right) Then, the cavity having been prepared by blunt dissection between the rectum and the bladder, as described in detail by McIndoe, the proctoscope invested with the skin graft was introduced (Fig 373, left) The inner part or obturator of the proctoscope was then immediately withdrawn so that

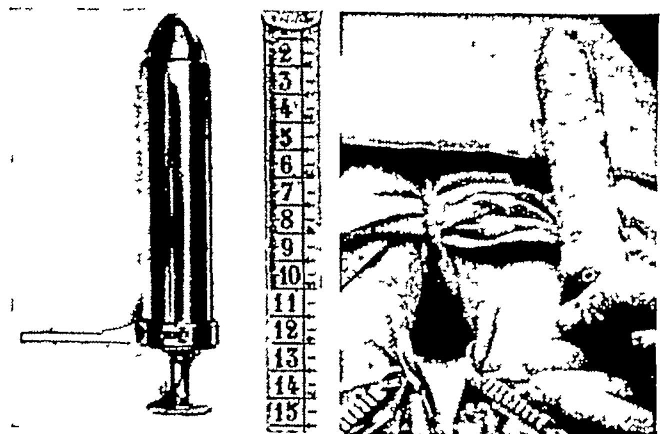


Fig 372 (left) The common proctoscope as used It consists of two parts (a) the inner (the piston) and (b) the outer (the cylinder) (Right) The proctoscope wrapped with the skin graft

normal intercourse is or should be possible. 81 patients satisfied these conditions. In these—usually of a high grade of intelligence—the mould had been retained well over the contractile phase and further care had been taken by intermitten dilatation to prevent contraction until marriage

(2) A satisfactory result is classed as one in which the vagina measures 7 to 12 by 3 cm and where intercourse is satisfactory but there is mild complaint of shortness There were 10 patients in this group Shortness was due to lack of co-operation to removing the mould before the period of contraction was over to haematoma formation and consequent loss of graft or to infection producing the same result The most important factor was undoubtedly too early removal of the mould

(3) A poor result is classed as one in which contraction is so severe that the vagina measures less than 7 cm in length and in which intercourse is unsatisfactory for either partner There were 4 patients in this group Most of them were of low intelligence and had entirely failed to co-operate during the post-operative treatment They were either of the shrinking violet variety and thought the whole affair "rude" or the even more sensitive who just couldn t stand it at all. Consequently they lost no opportunity of avoiding the use of the mould.

(4) Failure occurred three times One patient removed the mould and discharged herself from hospital. Complete contraction followed. Interestingly enough she has returned after four years with a strong wish to go through the operation again. She was engaged to be married at the time of the first operation and had fallen out with her fiance. In order to carry her point with him she had intentionally made the operation fail. She is now engaged for the second time but is four years older and wiser Two others failed for technical reasons The mould was discharged per rectum owing to excessive pressure and ulceration of the rectovaginal septum Curiously enough both fistulae contracted down rapidly and have not given trouble. The vaginal cavities have also contracted. It should be quite possible to re-operate on these 3 patients with a good chance of success.

Thus in this series of 96 patients 83 per cent obtained excellent results while only 3 per cent failed. There was no mortality, and the actual period of hospitalisation did not exceed three weeks The morbidity was low being confined to those cases in which a mild degree of pelvic cellulitis or perivaginal inflammation occurred. These results agree with those reported by Counseller of the Mayo Clinic who in 70 patients treated in this way reports excellent results in 80 per cent and failure in 7 per cent for the same reasons which I have encountered

SUMMARY AND CONCLUSIONS

Utilising modern plastic principles of inlay grafting and continuous dilatation until the contractile phase is over it is possible to construct an entirely satisfactory vagina with a high percentage of success (83 per cent) and low rate of failure (3 per cent) without danger to life and with low morbidity From the gynecological standpoint the functional effect cannot be obtained by any other procedure so easily

149 Harley Street
London W 1 England

Le Traitement de l Atrésie Vaginale par les Greffes Libres. SIR ARCHIBALD MCINDOE.

L auteur décrit son opération pour l absence congénitale de vagin Elle consiste essentiellement a tapisser une cavité de taille convenable créée entre le rectum et la vessie d'une greffe cutanée mince qui est maintenue en place par un moule léger en acrylie que l on laisse pendant 4 mois.

Le moule est enlevé au bout de ce temps et on lui substitue un dilatateur temporaire amovible

L auteur présente les résultats terminaux de 96 cas tous traités par cette technique et suivis pendant une période de 13 ans Dans 83% des cas les résultats furent excellents et il n'y eut que 3% d échecs Pas de mortalité opératoire et la période d'hospitalisation réelle n a pas dépassé 3 semaines. Morbidité faible limitée aux cas présentant un léger degré de cellulite pelvienne ou de l'inflammation périvaginale.

Du point de vue gynécologique il n est pas possible d obtenir avec un autre procédé un résultat fonctionnel aussi facile et aussi satisfaisant.

Behandlung der Vaginalen Atresie mit Freier Transplantation. SIR ARCHIBALD MCINDOE.

Der Verfasser beschreibt seine Operationsmethode bei angeborenem Fehlen der Vagina. Diese besteht im wesentlichen darin dass eine Hohle von angemessener Grösse zwischen dem Rectum und der Blase mit einem dünnen Hauttransplantat ausgelegt wird das vier Monate lang

8 Owens, Neal A suggested pyrex form for support of skin grafts in the construction of an artificial vagina Plast & Reconstruct Surg, 1 350, 1946
9 Holmes, W R Construction of a vagina with the use of skin grafts and vitallium mold Trans S Surg Assoc, 57 406, 1947
10 Blocker, T G, Jr Plastic construction of an artificial vagina Texas State J Med, 37 345, 1941
11 Grossen, R J Congenital absence of vagina Treatment and aftercare J Missouri M A, 44 903, 1947
12 Wharton, L R An improvement in the technique of constructing the vagina Am J Obst & Gynec, 60 871, 1950
13 Wharton, L R Difficulties and accidents encountered in construction of the vagina
14 Polycratis, G S Suggestions in the eye socket treatment with free skin graft Bulletin of Greek Surg Society, 1951

Une Technique plus Sure pour la Reconstruction du Vagin a l'Aide de Greffons Cutanes Libres. George S Polycratis

Dans le but d'éviter de sérieux inconvénients dus à une pression avec des matériaux durs sur le rectum et a vessie telle que celle exercée par les moules qu'on utilise pour l'insertion et l'immobilisation du greffon cutané dans le vagin artificiel, l'auteur a utilisé depuis 1952 un proctoscope de 12 x 3.5 cm qu'il a recouvert d'un greffon cutané de 30 x 8 cm Le tout est alors introduit dans l'ouverture artificielle, on retire le piston du colposcope et par la partie cylindrique qui reste on introduit une mèche de gaze Par la suite il retire progressivement la partie cylindrique tout en introduisant sous pression la mèche de gaze jusqu'à ce que toute la cavité en soit remplie

Cette méthode présente les avantages suivants

1 Une meilleure fixation et une meilleure immobilisation du greffon cutané avec une prise de 100%

2 La reconstruction du vagin le plus profond possible parce que le type de pression exercé permet de profiter de toute l'élasticité des tissus périnéaux

3 On peut éviter une pression nuisible due à des moules en matériaux durs

4 La méthode est inoffensive et très facile et très simple dans son exécution

Eine Zuverlassigere Methode zur Wiederherstellung der Vagina mit Freier Hauttransplantation. George S Polycratis

Um die schwerwiegenden Nachteile des Druckes auf Rektum und Blase durch Hartmaterialformen fur die Einfuhrung und Immobilisation von Hauttransplantaten in die kunstliche Vagina zu verhindern, benutzte ich 1952 ein Proktoskop (12 x 3½ cm), das ich mit einem Hauttransplantat von 30 x 8 cm umkleidete Dies fuhrte ich in die kunstliche Öffnung ein, zog den Stempel des Proktoskops heraus und fuhrte durch den zuruckbleibenden zylindrischen Teil einen Gazestreifen ein Darauf begann ich den zylindrischen Teil allmahlich herauszuziehen, wahrend der Gazestreifen unter Druck eingefuhrt wurde, bis die ganze Hohle mit Gaze ausgefullt war

Diese Methode bietet

1 Eine bessere Fixation und Immobilisation des Hauttransplantates mit 100% iger Einheilung

2 Die Herstellung der grosstmoglichen Vagina, da wir uns infolge des Druckes die ganze Elastizitat des perinealen Gewebes zunutze machen

3 Der schadliche Druck der Hartmaterialform wird vermieden

4 Sie ist vollig unschadlich, sehr leicht und sehr einfach

Una Técnica mas Segura en la Reconstrucción Vaginal con Injertos de Piel. George S Polycratis

Para evitar serios problemas con la fuerte presión sobre el recto y la vegija por moldes de materiales duros usados para la inserción e inmobilización de los injertos de piel dentro de la vagina artificial, usé en 1952 un proctoscopio de 12 x 3½ cms, que forré con un pedazo de piel de 30 por 8 cms Después lo introduje en la entrada artificial, jalé el fistón del proctoscopio y a través de la parte cilíndrica que quedaba, introduje una tira de gasa Por consiguiente fui jalando la parte cilíndrica y presionando la gasa hasta llenar la cavidad

Este método ofrece

1 Una mejor fijación e inmobilización del injerto de piel, integrándose un 100%

2 La reconstrucción de la vagina a todo lo largo, porque con la presión obtenemos toda la elasticidad del perinñé

3 Quita la presión de los moldes de material duro

4 No es molesto, es muy sencillo y muy simple

On the Formation of an Artificial Vagina Using the Sigmoid Flexure. Hans Hermann Schmid, M D, Professor, *from the Department of Gynecology, Rostock, Germany*

The formation of the organ of copulation by skin grafts, epidermis or amnion is harmless But later it has the tendency to *shrink* *The formation of the vagina by the small gut* is to be avoided because of its great primary mortality

The rectum method after Schubert is not so dangerous, but it includes the disadvantages of being followed by a weakness of the sphincter or of the formation of rectal fistulas

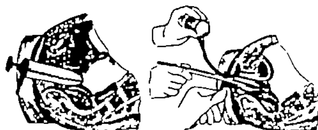


Fig 373 (left) The proctoscope wrapped with the skin graft, introduced into the artificial vagina (Right) *After removal of the piston a continuous* strip of gauze is introduced with pressure in all directions, while the proctoscope is withdrawn gradually

only the outer speculum part like a cylinder with an opening at each end, remained in the vagina Then through the outer end, with long anatomical forceps a continuous strip of gauze 3 cm in width, impregnated with 5 per cent xeroform ointment was introduced with sufficient pressure up to the inner opening of the proctoscope and through it against the blind upper end of the skin graft which was destined to line the end of the vagina (Fig 373 right) In this manner the skin graft was firmly and uniformly applied to the raw surface of the end of the vagina over a sufficiently wide area including the anterior and posterior parts of the pouch of Douglas Following this gradual slow withdrawal of the proctoscope was begun with one hand while at the same time with the other hand the continuous strip of gauze was fed into the cavity on all sides to fix and immobilize in this way the skin graft over every part of the raw vaginal surface This procedure was continued until on complete withdrawal of the proctoscope all of the cavity was filled with a continuous strip of gauze about 8 meters in length. The outer circular border of the graft was fixed with interrupted sutures around the edge of the initial operative wound a little behind the labia minora Further immobolization was secured by tying the long ends of the sutures across the opening over large fluffed pieces of gauze. Then the usual T binder and a retention catheter left in place for six days during which antibiotics were administered, completed the operation. The postoperative course was uneventful and without fever The first change in dressing was done on the 8th postoperative day when all the gauze in the cavity was removed. After cleansing of the cavity and removal of the sutures, 100 per cent take of the graft was noted A very light metallic mold was then introduced into the cavity and was worn by the patient for 3 months to prevent secondary shrinkage of the graft In our first patient the result was excellent and a sufficiently large vagina was constructed

Following this first successful case operated on in 1952 in the Gynecology Department of *the Evangelismos Hospital* (Chief Professor Antonopoulos) four more cases with 100 per cent take and excellent results were operated upon in 1952 1953 and 1954 one in the same Department and 3 in the Plastic Surgery Department of the Laikon Hospital all closely followed up

Summary

A new technique in vagina construction is presented, which possesses the following advantages

1 A better fixation and immobilization of the skin graft with 100 per cent take.

2. Construction of the largest possible vagina, because by adequate pressure of the strip gauze against the walls of the cavity all of the elasticity of the perineal tissues is exploited.

3 Undesirable pressure upon rectum and bladder by molds of hard materials used for immobilization of the skin graft is avoided.

4. The technique is easy simple and harmless. It requires just the skin graft and an ordinary proctoscope

References

1 McIndoe A H., and Banister J B Operation for cure of congenital absence of vagina. J Obst & Gynec Brit Emp., 45 490 1938
2 Babcock Wayne Discussion of paper by Dannreuther W T The Frank-Geist operation for congenital absence of vagina. Am J Obst. & Gynec., 36 452 1938
3 Brown J B and McDowell F "Skin Grafting." J B Lippincott Co., 2nd Edition, 1949
4. Bryan, A L Nigro J A and Counseller V S One hundred cases of congenital absence of the vagina Surg Gynec & Obst., 88 79 1949
5 McIndoe A. H The treatment of congenital absence and obliterative conditions of the vagina Brit. J Plast Surg., 2 254, 1950
6 Adams, W M Construction of an artificial vagina. Surg., Gynec & Obst., 76 746 1943
7 Counseller V S and Sluder F S., Jr Treatment for congenital absence of the vagina. S Clin. North America, 24 938 1944.

XI

HAND

Combined Tendon and Nerve Injuries at the Wrist.

A R WAKEFIELD, M S, F R C S, F R A C S, *59 Collins St, Melbourne, C 1, Australia*

My prime purpose for selecting this subject to bring before the Congress is to draw attention to the ever-increasing importance to surgery of primary definitive treatment of injury It has seemed to me that the subject I have chosen exemplifies that importance very well and that, furthermore, the mere presence of such a subject and other similar subjects on the agenda for this meeting shows that the influence of plastic surgeons is being felt more and more in the surgery of injury

It is unfortunate, I think, that in the past the influence of plastic surgeons in the field of trauma has been largely confined to the carrying out of various secondary procedures in an elective way, often months after some relatively junior general surgeon has done his best at the primary operation with his very limited armamentarium Much of this is due, no doubt, to the tendency towards isolationism in the specialties which has developed in many countries and even within many hospitals, and which limits the availability of the specialist for immediate casualty treatment in the place where it is most needed Much of it is due too, I have no doubt, to the tendency of us all to follow the line of least resistance It is so much more comfortable to carry out a three-hour operation on an elective operation list a few weeks after injury than it is to do it at once whenever it occurs—usually at the most inconvenient time of the day It is also much easier to bring the cases together into centralized units One simply says to other surgeons "just sew up the skin and then send them to me at your convenience," and I am convinced that many surgeons throughout the world, some of whom have a wide influence on the teaching of surgery, have so far allowed their surgical judgment to be clouded by expediency and convenience that they have built up an entirely false case for delayed or secondary repair of damaged tissues

Nowhere is this better exemplified than in the case of severed tendons and nerves at the wrist No one will deny, of course, that in grossly contaminated and mangled injuries of many hours duration, perhaps associated with loss of tissue or shocking injuries elsewhere on the body, it would be unwise to attempt a primary repair of these structures But such cases are the exception in civil practice The injury almost invariably results from a sharp cut, without tissue loss, occurring very often in children who fall on sharp tins or bits of broken glass, and the arguments against primary repair in such cases simply will not hold water

It is said, for example, that the risk of sepsis is too great to justify the procedure and that such risk is greatly reduced if we repair only the skin and leave the repair of deeper structures until some weeks later In my experience with the primary repair of these structures in clean cut injuries there has been no single septic complication in the last ten years, and with appropriate first aid care and antibiotic coverage the time limit for primary repair can be safely extended up to twenty-four hours and sometimes longer I believe that fear of sepsis should not be allowed to cloud the issue in the type of case I am discussing

It is said, justifiably, that secondary repair in a specialist unit in the hands of an expert is better than primary repair in the hands of the tyro But surely in these days of fast transport

The formation of an artificial vagina by the sigmoid flexure includes the advantages of the rectum method without its disadvantages With healthy young women with a normal intestinal flora the risk in performing this laparotomy is a small one. There will neither be an incon tinence of the sphincter ani nor a formation of a fistula.

The following modifications of the operative method have been performed at the gynecologi cal department of Rostock.

In case of the aboral end of the sling not reaching the introitus of the vagina without tension one can perform a *prolongation* of about 5 cm quite easily by double ligaturing and cut ting through the arteria and vena sigmoidea as near as possible to the source of the arteria and vena mesenterica

Placing of the newly formed vagina into the connective tissue space *completely extraperi toneally* in order to avoid a possible peritonitis caused by gangrene (No gangrene has been encountered in the writer's own 20 cases) After this step never before it broad side to side enteroanastomosis to restore the intestine So far the author has operated on *20 cases* using the method. There was *no case of death* no elevation of temperature no gangrene of the artificial vagina no trouble within the urinary tract

All operated women have been postopera tively examined with good results of rectal continence There was no troublesome secretion of intestinal mucus no shrinking of the artificial vagina A slight degree of stenosis was found in some cases at the site of anastomosis of the mucous membrane of the introitus and the large intestine. The formation of an artificial vagina using the sigmoid flexure demands experience in operating on the intestine and can be recom mended as a safe and successful method which secures the most durable results

Formation d'un Vagin Artificiel a l'Aide de l'Angle du Sigmoide. HANS HERMANN SCHMID

La formation d'un vagin artificiel à l'aide de greffes cutanées d'épiderme d'amnios etc n'est pas du tout dangereuse mais toutes ces méthodes ont le grand inconvénient de comporter un rata tinement sans parler du fait que la vagin néoformé est trop sec l'utilisation de lambeaux cutanés fait qu'il est impossible d'éviter la présence de cica trices laides autour des orifices génitaux externes. La construction d'un vagin artificiel à partir de l'intestin grêle est une opération très dangereuse. Une des meilleures méthodes de construction du vagin artificiel à l'aide du rectum (méthode de Schubert) entraine quelquefois une incontinence du sphincter anal ou des fistules rectales La sécrétion de suc intestinal est très importante au niveau de l'intestin grêle mais juste suffisante quand on utilise le rectum La meilleure méthode pour construire un vagin artificiel est d'utiliser le sigmoïde Description des modifications apportées par l'auteur à cette méthode qui a été utilisée dans 20 cas sans entraîner de décès Dans tous les cas, les rapports sexuels postopératoires ont été satisfaisants et indolores

Über die Bildung einer Künstlichen Vagina unter Benutzung der Flexura Sigmoidea. HANS HERMANN SCHMID

Die Bildung künstlicher Vaginen unter Benut zung von Haut- Epidermis- Amniontransplanta ten etc. ist durchaus nicht gefährlich aber alle diese Methoden haben den grossen Nachteil der Schrumpfung, abgesehen davon dass die neue Vagina zu trocken ist. Bei der Benutzung von Hautlappen sind hässliche Narben in der Umgebung der äusseren Genitalia unvermeidbar Eine künstliche Vagina aus dem Dünndarm zu formen, ist ein höchst gefährliches Unternehmen Eine der besten Methoden die Bildung einer künstlichen Scheide aus dem Rektum (Schubert's Methode) führt manchmal zur Inkontinenz des Sphinktor ani oder zu Rektumfisteln. Die Sekretion von Darmsaft ist vom Dünndarm zu stark aber gerade richtig bei Gebrauch des Rektums Die beste Methode ist die Bildung einer künstlichen Vagina aus dem Sigmoid Des Autors Modifikation dieser Methode wird beschrieben. Diese Methode wurde in 20 Operationen ohne einen Todesfall ausgeführt. In allen Fällen war die postoperative Kohabitation befriedigend und schmerzlos

Formacion de una Vagina Artificial Utilizando la Flexura Sigmoidea. HANS HERMANN SCHMID.

La formación de una vagina artificial con injertos cutáneos es factible pero estos métodos tienen la desventaja de que la vagina dé nueva formación se contrae y es muy seca Por el uso de colgajos cutáneos el resultado puede ser también satisfactorio pero quedan cicatrices desagradables alrededor de la vagina. Formar una vagina artificial con el intestino delgado es un procedimiento peligroso Uno de los mejores métodos, el de la utilización del recto (método de Schubert) a veces produce incontinencia del esfinter del año o fistula rectal. La secreción de jugos intestinales es muy fuerte cuando se utiliza intestino delgado pero es la adecuada cuando se utiliza el recto para lo cual el autor utiliza el sigmoides. Se describen las modificaciones del autor a este método Se reportan 20 operaciones sin muertes. En todos los casos las enfermas pudieron cohabitar con satisfacción y sin dolor

(opposée à la réparation secondaire) des tendons et des nerfs dans ces traumatismes Une revue des arguments invoqués par les partisans de chacune de ces deux méthodes est présentés par l'auteur qui essaye en même temps de défendre son point de vue à savoir que la réparation primitive est de beaucoup le traitement de choix de toutes les plaies nettes à ce niveau Il reconnait toutefois que certaines mesures d'urgence et certaines circonstances peuvent permettre de différer les indications chirurgicales et de réserver dans quelques cas l'exploration des tendons et des nerfs dans un temps secondaire qui aura lieu plus tard dans de nouvelles conditions

On insiste particulièrement sur le traitement de ces traumatismes chez l'enfant où la réparation primitive est encore plus nécessaire et on insiste sur l'usage convenable d'appareillages pour empêcher la contracture digitale au cours de la période postopératoire alors que le nerf se trouve en pleine période de guérison

Kombinierte Sehnen- und Nervenverletzungen des Handgelenks A R WAKEFIELD

Erhebliche Meinungsverschiedenheit zwischen den verschiedenen Schulen in verschiedenen Teilen der Welt besteht uber das Problem der primaren im Gegensatz zur sekundaren Wiederherstellung der Sehnen und Nerven in diesen Fallen Es wird eine Übersicht uber die von beiden Seiten vorgebrachten Argumente in dieser Fage gegeben und ein Versuch gemacht, des Verfassers Standpunkt zu rechtfertigen, daβ die primare Wiederherstellung bei weitem die Behandlungsmethode der Wahl bei allen sauberen Wunden und glatten Schnittwunden dieser Art ist Hingegen wird anerkannt, daβ unter gewissen Umstanden die Rucksicht auf Zweckmaβigkeit die rein chirurgischen Indikationen uberwiegen und zu der Entscheidung fuhren kann, gewisse Falle fur die sekundare Exploration von Nerven und Sehnen zu einer spateren Zeit unter besseren chirurgischen Bedingungen zuruckzustellen

Auf die Behandlung dieser Verletzungen wird besonders bei Kindern hingewiesen, da bei diesen die primare Wiederherstellung noch dringlicher ist, besonderer Nachdruck wird auf die richtige Anwendung von Schienen gelegt, um Fingerkontrakturen wahrend der postoperativen Periode zu vermeiden, wahrend der die Erholung der Nerven fortschreitet

Lesión Combinada de Tendón y Nervio en la Muñeca. A R WAKEFIELD

Aun hay desacuerdo entre las diversas escuelas de varias partes del mundo en cuanto a la reparación primaria o secundaria de las lesiones tendinosas y nerviosas en estos casos La revisión de los argumentos de ambos bandos se realiza, asi como se intenta justificar el punto de vista del autor de que la reparación primaria es sin duda el tratamiento de elección de las heridas limpias de esa clase Se reconoce sin embargo, que en ciertas circunstancias es conveniente esperar para tener mejores condiciones quirúrgicas

Se hace particular referencia al tratamiento de estas lesiones en niños, en los cuales el caso para reparación primaria es aun mas indicado y se subrays el uso apropiado de férulas para evitar la contractura de los dedos en el período post-operatorio, mientras progresa la recuperación nerviosa

---

The Treatment of the Severed Long Flexor of the Thumb. VÁCLAV KARFÍK, M D , Docent, *Chief, Plastic Surgery Department, Brno, Czechoslovakia*

The long flexor of the thumb differs in its anatomy and function from the group of flexors of the fingers It is the only long flexor of a two-phalanx finger, which has a mobile metacarpus, allowing a range of positions of the thumb The complexity of this movement is due not only to the variety of the form of joints, but also to the complex collaboration of all muscles of the thumb The stabilising function mostly belongs to the relatively weak short muscles, and the general movement, strength and ability of the thumb to the long muscles

The activity of the thumb is represented by the collaboration with the other fingers In case of loss of opposing fingers, the cardinal function of the hand namely, the grip, is possible only if the space between the first and second metacarpals is deep enough and the thumb has preserved its active mobility When analysing the functional position, we see, however, that in the majority of working positions the distal phalanx of the thumb is maintained in semiflexion If there is no active flexion of this phalanx the hand becomes all at once less useful It loses its gentle grip, pinch and causes partial or total inability for work in a whole range of finer occupations, especially those of women On the other hand the fixed distal phalanx in semiflexion is already a plus for the ability of the hand

The activity of the long flexor is conditioned by the independent strong forearm muscle, the strength of which is considerable It has a comparatively long tendon, the functional length of which is smaller in contrast to the other long flexors of the hand [1, 2] Bunnell gives the average excursion range of the tendon above the wrist

where specialist services can in most places be available to anyone within twenty four hours, the proper comparison to be drawn is between the two procedures in the hands of the same expert, and I believe that any surgeon who is prepared to make such a comparison on even a small scale will come to the following con clusions

(1) That all cases of tendon and nerve injuries at the wrist should be repaired primarily if the state of the patient and his wound will allow and if he can be placed in the hands of a competent surgeon within twenty four hours

(2) That the technical ease with which retracted tendons can be drawn down and sutured accurately and the way in which nerves can be oriented and repaired without loss of substance or further injury together with the relative simplicity of insulating one repaired structure from its neighbour with loose filmy paratenon are the main reasons for the better results from primary repair

Attempts have been made by some surgeons to make out a case for special consideration for nerves in these cases and to insist on delayed repair of the nerves even though conceding that tendons may be best repaired at once Seddon s teaching has had a wide influence in this regard. I would say at once that I regard this concept as having had a most unfortunate influence on the surgery of trauma generally Separation of the management of the tendons and the nerves adds insurmountable complications for just as one is about to encourage active tendon function and commence splinting which is so important in preventing contractures one must perforce operate again to repair the as yet unrepaired nerve. The arguments brought forward in favour of delayed nerve repair are largely theoretical and are simply not borne out in practice Furthermore, they take no account of the enormous influence of the age of the patient upon results—no one who has seen the extraordinary rapidity and completeness of nerve recovery following primary nerve repair in early childhood could possibly accept a generalization which demands delayed repair at all ages

I have laboured this point for I believe it is fundamentally important that we accept primary repair in these cases Most have already accepted it and may wonder why I spend so much time on it It has however a corollary and that is of course that if we believe in the merits of primary repair of injury and if we think that we as plastic surgeons have something to offer in its execution then we must be prepared to make ourselves available more and more for immediate help to the injured and abandon the old conception of plastic surgery units being places to which selected cases are referred for secondary consideration of disabilities which have been incurred months or years earlier

Having decided then upon immediate repair of the tendons and nerves there are two technical points in management which I want to stress. The first is that when both sublimis and profundus tendons are severed there is nothing to be gained by repairing both—in fact if both are repaired cross union between the two may limit the action of both to that of the more proximally inserted tendon and the profundus action may be lost It is better to resect the sublimis for as far as one can conveniently reach by pulling upon its proximal and distal ends and to allow the cut ends to retract far away from the operative field. This will also considerably reduce the operating time and allow more detailed attention to be given to the other structures.

The second point is the use of the elastic traction splint during the period of nerve recovery and restoration of small muscle function. A flexion contracture deformity of the fingers will always follow these injuries except in babies and very young children, unless steps are taken to provide an antagonistic action to the pull of the long flexors just as soon as the repaired tendons are strong enough to work against this without fear of rupture. It is our practice to fit an elastic traction splint for this purpose at the end of five weeks and to insist that this be worn almost continuously until the risk of tendon contracture is past and the nerves are recovering

I know of no condition in surgery where the fruits of a painstaking well-timed operation and carefully supervised after treatment are more rewarding and the results of inexperienced haphazard management more disastrous and crippling

Plaies Combinées des Tendons et des Nerfs au Niveau du Poignet. A R. Wakefield

Il continue à persister un important désaccord entre les différentes écoles des diverses parties du monde en ce qui concerne la réparation primitive

of a severed tendon On the whole the right principle has been accepted that it is necessary to try primary suture if there are favourable conditions in the wound, the factor of time and that of expert operative technique Not only the experience with an early closing of any traumatic wound, but the need of early renewed functional state of the synergically acting muscles speak in favour of the primary tendon suture Although we distinguish between a primary and a secondary repair, the result of both is determined by localisation, according to which we distinguish between the treatment in the palm sector and that in the finger Only the palm sector in the course of a comparatively free sheath is suited for an ordinary primary suture

If the tendon is cut through in the finger the only indication is the Iselin reinsertion of the tendon into the distal phalanx In this operation monofil nylon or Czech polyamid silon have proved very efficient The operation is essentially more difficult than the ordinary suture in the thenar space Therefore a severed tendon in the finger often brings us face to face with the decision of a secondary repair The location of the wound and the exact symptom analysis make it possible for us to decide on this procedure in advance and not when the operative field is open The indications for a secondary repair are therefore the same as for the flexors of all the other fingers Some conditions for the secondary suture of the long flexor tendon of the thumb are different From what has been said before it is evident that the usual secondary suture is done very rarely The possibilities for secondary suture of this tendon are exactly defined by the location of the wound which severed the tendon In the secondary action we find, however, that the distraction of both tendon-ends, in the majority of cases, cannot be overcome by the simple extraction of the ends Even after a short time a defect appears here, which is the greater the higher the place of dissection Therefore a secondary reinsertion is less often done It can be carried out only with maximal flexion of the thumb during healing, which is always connected with the risk of a diminished mobility of the finger

In the majority of secondary operations we are confronted with a tendon defect which must be filled In present day surgery the material for tendon repair is fascia lata with perifascial gliding soft tissue, which best guarantee the mobility of the new tendon The fundamental condition for a free tendon transplant is a sufficiently wide fibrous canal, through which the tendon must be pulled The almost complete extirpation of the palmar wall of this canal with the distal tendon-end is necessary In secondary sutures we mostly find the tendon-sheath empty, but it has not always the same appearance Sometimes it looks like a thin fibrous strip, sometimes thick as if it contained part or the whole tendon On opening we see the granulated dark-red tissue filling the whole sheath The tendon-wall is usually thickened, silvery, with clearly distinguishable longitudinal fibres Evidently this increase of thickening and strengthening of the fibrous structure of the sheath-wall is the result of functional irritation The passive mobility of the tendon sheath is rather great even if the excursion range of the tendon is comparatively small The tendon together with its sheath is imbedded between the muscles in the radial bursa which has numerous folds enabling a comparatively great movement of the sheath [2] The mobility of the sheath is transferred from the upper stump of the tendon with which it is firmly united This active mobility of the sheath induced us to use the tendon-sheath to cover the defect of the tendon We separated the sheath at the level of the upper border of the transverse fibrous ligaments over the metacarp-phalangeal joint (Fig 374, top left and right) We isolated it with all the surrounding tissue of the bursa and pulled the sheath out of the carpal canal (Fig 374, lower left) Thus we gained a

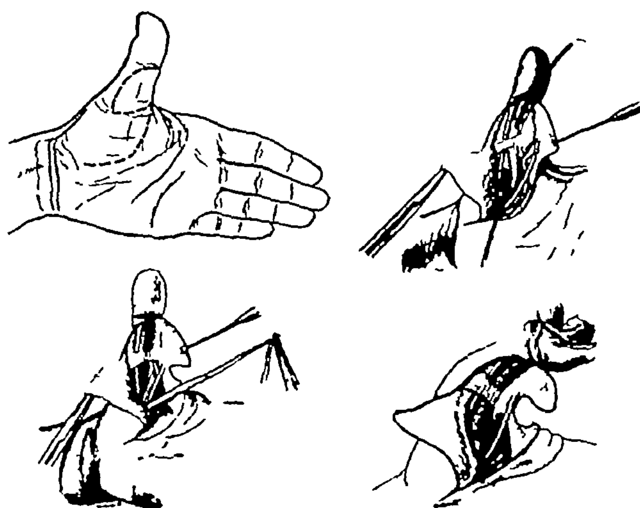


FIG 374

as 52 mm, the average total amplitude of other tendons of flexors in this location as 70 mm Over the metacarpal bone 32 mm in the others 32 6 over the phalanx 12 – in the others 19,8 These findings and the fact that the tendon runs over only one interphalangeal joint offer comparatively great hope for the reestablishment of activity even in case of lesser mobility of the tendon after restoration Even the fixed semi flexion of the distal phalanx correcting the hypertension restores a great part of the ability for work if the activity of the short muscles is preserved When suturing and restoring the tendon of the long flexor of the thumb certain difficulties arise due to the anatomical structure of the gliding and attaching apparatus of the tendon. The thumb flexor has its own continuous tendon sheath. Even if there are variants in connection with other flexor sheaths the tendon in the great majority of cases, runs in a separate tunnel which descends without interruption to the base of the distal phalanx. In the palm it runs on the whole freely in the intermuscular space of the thenar eminence.

Over the carpo-metacarpal joint and over the first phalanx it runs in a tight fibrous tunnel the wall of which is reinforced by transverse fibres which represent the real vaginal ligaments. The narrowest part of this tunnel is above the digital joints This place is also the greatest obstacle to the restoration of the mobility of the sutured tendon. The long flexor tendon course in the sheath means a diminution of the tendon. In the long sector the tendon is nourished by the mesotenon blood vessels, which upon transection and retraction of the tendon rupture. Thus the nutrition is endangered actually the tendon ends are the first to be oedematous and followed by shrinkage and adhesions, which contribute to a considerable widening of both ends of the transected tendon Bunnell says that the retraction of the transected tendon is generally as great as the excursion range in this place eventually half of the contractility of the muscle The place where the tendon is transected is actually of great importance. If it is transected outside the sheath, the dislocation of the tendon ends is always difficult to recognize The tension of the muscle at the moment of accident plays an important rôle Often it is the first attempt at moving, even during medical examination (Rozov), which decides the distraction of the tendon-ends.

If the tendon is cut through inside the sheath, the mesotenial vincula can prevent a great retraction of the tendon The longer the sheath the longer the retraction Therefore the distraction of the ends of the long flexor tendon of the thumb is considerable. The proximal end is always proximally dislocated often as far as the forearm, together with the proximal end of the tendon sheath, which is very mobile in this direction The end of the tendon remains enclosed in the sheath. By malnutrition and shrinking the dislocation of the tendon is further increased There are adhesions to the sheath wall which after some duration exclude the mobility of the tendon Thus a defect of the tendon appears. The circumstance that the tendon-end quickly swells and that the canal under the volar ligament is considerably narrowed, prevents the expression of the tendon-end. Even the extraction by instrument in the curved course of the tendon is difficult. The finding of the tendon-end is mostly possible only by means of a new incision on the forearm. The opening at the wrist always prolongs and aggravates the operation.

From what has been said about the anatomical and functional circumstances, such conditions may arise under which we can begin to restore the transected tendon of the long flexor of the thumb The origin the duration and the place where the tendon was cut through are determining factors. All common rules about the suture of the flexor tendon hold good. The difference lies in the fact that the whole tendon runs in the sheath and that the dangerous sector the narrow fibrous canal runs only over one phalanx (of the finger) The suture of the tendon into the sheath gives comparatively good results, especially as only one flexor tendon is sutured.

The suture at the level of the proximal phalanx always adheres to the surrounding tissue due to the canal being narrow to the difficult suturing from the technical point of view and to the malnutrition of the upper tendon end

The latest principles of traumatology based on the knowledge of the pathophysiology of the healing processes and enriched by a whole row of new methods for combatting wound infection have removed the formerly strict and limited indications for a primary and secondary suture

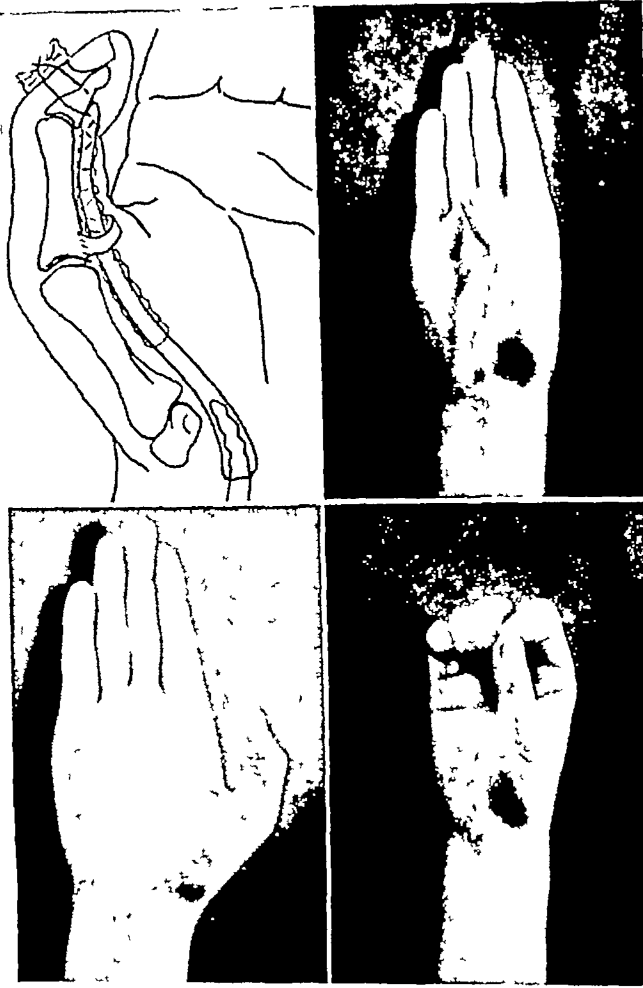


FIG 376

is done with the fascia lata together with the epifascial fat tissue Even if this action is easier than that in the other fingers, it is not simple and requires expert operative technique, good experience and often cannot be done without an auxiliary incision at the wrist

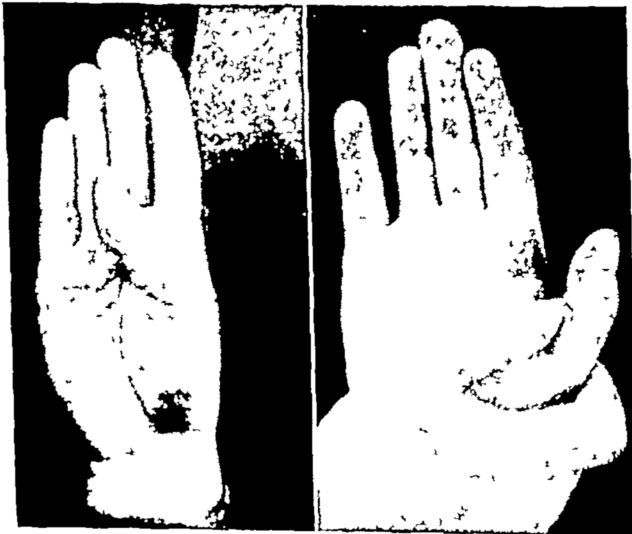


FIG 377

In the tendon repair we use an unusual method, namely that of the flexor-sheath inserted into the last phalanx This simplified method by means of the sheath, achieved good results, especially in young people Also the union of the tendon-transfer with the isolated sheath in the palm, achieved a good active mobility of the thumb This method simplifies the operation and reduces the risk of adhesions

REFERENCES

1 Bunnell Surgery of the Hand, Lippincott, III Ed
2 Kaplan, E B Anatomy of the Hand, Lippincott

Le Traitement de la Desinsertion du Long Fléchisseur du Pouce. VÁCLAV KARFIK

Les propriétés tant anatomiques que fonctionnelles du long fléchisseur pouce rendent possible une technique opératoire différente pour la suture et la réparation du tendon par rapport à celle des autres tendons fléchisseurs du doigt L'auteur expose d'une manière précise les indications tant de la suture primaire que de la suture secondaire Dans le mouvement tendineux il y a deux secteurs ce qui précisément limite les possibilités opératoires Dans l'action primaire la suture immédiate et la réinsertion à la manière d'Iselin constitue les procédés les plus fréquents Dans l'action secondaire la suture simple est plutôt rare Dans de nombreux cas il est nécessaire de faire une transposition tendineuse qui selon ce qu'a préconisé Bunnell est faite avec du fascia lata garni de son tissu graisseux épifascial même si cette action est plus facile que sur les autres doigts sa réalisation n'est pas simple et demande une bonne technique opératoire, une grande expérience sans parler de la nécessité fréquente d'une incision complémentaire sur le poignet

L'auteur a utilisé une voie peu employée dans la réparation tendineuse, à savoir la gaine du fléchisseur insérée sur la dernière phalange Cette méthode simplifiée a donné de bons résultats surtout chez les sujets jeunes En outre la réunion du transfert tendineux et de la gaine isolée dans la paume a permis une bonne mobilisation active du pouce Cette méthode simplifie l'opération et réduit les risques d'adhérences

Die Behandlung des Durchtrennten Langen Flexors des Daumens. VÁCLAV KARFIK

Die anatomischen und funktionellen Eigenschaften des langen Flexors des Daumens gstatten eine

sufficiently long fibrous strip similar to the tendon. We succeeded in inserting this strip into the end phalanx (Fig 374, lower right)

Discussion

By using the empty thickened sheath for the repair of the tendon we changed the comparatively difficult procedure of the transplant of the tendon into a simple insertion of the sheath which is similar to the primary reinsertion of the ruptured tendon The extraction of the upper tendon-end is unnecessary

The active mobility of such a tendon is generally sufficiently great and increases through rehabilitation especially in children and young persons The insertion of the sheath must be done in the deep flexion of the finger joint the reeducation therefore must be long enough

We used this method four times in different combination and always with very good results The first case was in 1947 the remaining in the last two years In the first case we achieved a firm semiflexion of the last phalanx in a female which meant a considerable increase in the working capability in household work. To our surprise we found a substantial active mobility of the sheath.

Therefore we repeated this procedure in the second case that of an eleven-year-old boy We restored the complete active mobility of the thumb The tendon was ruptured at the level of the base of the first phalanx, the stump being dislocated high in the wrist The excursion of the sheath was so great as to make us believe that this procedure is especially suited for young persons (Fig 375)

In case we do not succeed in separating the sheath with a sufficient quantity of gliding tissues there is no objection to covering the sheath by transfer of the perifascial fat as is *done* in the transfer of the fascia lata, which we did in a girl of 14 years age (Fig. 376) Even this action considerably simplifies the operation.

Good experience with this procedure induced us to use the sheath in connection with the transfer of fascia lata in such cases where the tendon sheath was partly lost together with the tendon (Fig. 377) The proximal thickened end of the sheath was united with the fascia lata transplant

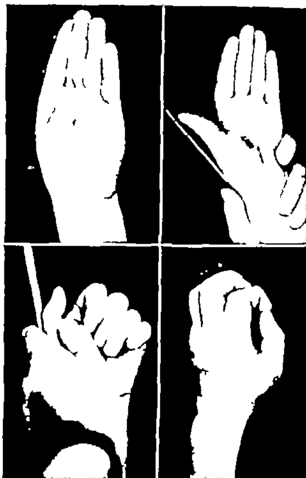


Fig 375

which covered the whole defect of the tendon. We applied this method in 20-year-old women, resulting in the complete restoration of their capability to work. This combined action also simplifies and shortens the operation. By it we avoid the danger of frequent adhesions in the narrow canal under the transverse carpal ligament

Summary

The anatomical and functional properties of the long flexor of the thumb allow a different operative technique in suturing and restoring the tendon from that in the other flexors of the *fingers* The *indication for a primary* and a secondary suture are precisely determined In the tendon-course we distinguish two sectors which precisely determine the possibilities of the operation. In the primary action the primary suture and the Iselin reinsertion are most frequent. In the secondary action the simple suture is rather rare In most cases the tendon-transfer is necessary which according to Bunnell

TABLE V LATE RESULTS OF OPERATION

Good results at follow-up	97	124
Good results presumed (Patients dead or not traced)	27	
Poor result at follow-up	31	33
Poor result known to have occurred but patient not traced at follow-up	2	
Total		157

TABLE VI ANALYSIS OF GOOD RESULTS

Healing and progress uneventful	115
Haematoma occurred, but evacuated within 48 hours	5
Skin graft to palm applied within two weeks of operation	4

TABLE VII ANALYSIS OF POOR RESULTS

Residual stiffness of finger joints due to Haematoma leading to loss of skin and skingraft	14
'Arthritis' of finger joints	8
Lack of co-operation in use of hand	3
Delay in healing	3
Primary loss of skin	3
Oedema alone	1
Recurrence	1

CONCLUSIONS

1 The radical operation has given 79 per cent of satisfactory results with less than 5 per cent of local recurrence within the field of operation

2 The operation should be performed on the understanding that even when successful

a The hand will require a dressing for 2-4 weeks

b The hand will not be useful for six weeks

c Work may be interrupted for three months

d Full grip may take six months to develop

3 There is a risk of complications arising from the operation viz Haematoma, Loss of skin, Oedema

These complications treated promptly and energetically (and perhaps needing a second operation) need not necessarily spoil the result, but are likely to lead to permanent disability in the form of stiffness, contracture, tenderness, poor circulation, and diminished power of grip The frequency of complications, and the disaster resulting therefrom, can be reduced with improved technique and increasing experience, and in particular improved by

a Measures to reduce the incidence of haematoma—namely—patience at operation, post-operative elevation of the limb, quiet anaesthetic and recovery In this connection the plaster slab dressing technique described in detail elsewhere has proved useful (Mortimer H Shaw, 1951)

b Complete evacuation of haematoma within 48 hours—under anaesthetic if necessary

c Early excision and grafting of skin loss before infection and oedema occur

4 The radical operation is indicated in fit adults with commencing or established flexion deformity of the fingers, (3rd and 4th degree) but should not be employed in the 1st and 2nd degree cases having no functional disability, and no contraction

5 The radical operation may be contraindicated

a In old age

b In the presence of multiple small joint arthritis

c In the presence of cardiovascular or respiratory disease

6 Results are most successful

a In those who normally use their hands to earn their living, or in their recreation

b In those able and willing to cooperate in the exercises and use of the hand after operation

c In age group 40-60

d When complications do not occur or are promptly treated

7 Conversely, results are most disappointing

a In those who do not normally make much use of their hands in work or play

b In those who are unable or unwilling to cooperate in use of the hand after operation

c In the younger age group in which the disease often assumes a very active form and tends to recur in untreated fingers or thumb, sometimes within the area of operation, and in whom the fascial involvement may be vascular, diffuse and widespread

Results are less rewarding in the older age group who may not live long enough to reap the benefit of the radical operation, or whose finger joints readily become stiff

d When complications of haematoma and/or loss of skin are not promptly treated

8 The overriding consideration leading to a successful result is to restore a healed hand to normal use and physiotherapy within three weeks of operation

andere Operationstechnik hinsichtlich Nahtlegung und Wiederherstellung der Sehne als bei den Flexoren der anderen Finger Die Indikation der primären und sekundaren Naht werden genau festgelegt Im Verlauf der Sehne konnen wir zwei Abschnitte unterscheiden, die die Operationsmöglichkeiten genau begrenzen. Bei der Frühbehandlung ist die Primärnaht und Isolin'sche Reinsertion am häufigsten Bei der Sekundarbehandlung ist die einfache Naht ziemlich selten. In den meisten Fällen ist eine Sehnenverpflanzung notwendig, die entsprechend Bunnell mit der Fascia lata im Zusammenhang mit dem epifascialen Fettgewebe ausgeführt wird. Selbst wenn diese Behandlung leichter ist als die bei den anderen Fingern so ist sie doch nicht einfach und erfordert eine gute Operationstechnik gute Erfahrung und sie kann oft nicht ohne einen Hilfsschnitt am Handgelenk vorgenommen werden.

Bei der Sehnenplastik benutzen wir einen ungewöhnlichen Weg, namlich die Einpflanzung der Flexorenscheide in die Endphalanx Diese vereinfachte Methode mittels der Scheide führt zu guten Ergebnissen besonders bei jungen Leuten Ebenso bewirkt die Vereinigung der verpflanzten Sehne mit der isolierten Scheide im Handteller eine gute aktive Beweglichkeit des Daumens Diese Methode vereinfacht die Operation und verringert das Risiko von Adhasionsbildungen.

Tratamiento del Flexor Largo del Pulgar VÁCLAV KARFIK.

Las propiedades anatómicas y funcionales del flexor largo del pulgar originan técnicas operatorias diferentes en la restauración y sutura del tendón de las uñdas conlos flexores de los otros dedos. La indicación para una sutura primaria o secundaria se determina con precisión En el curso del tendón, distinguimos dos sectores, que limitan precisamente las posibilidades de la operación En la acción inicial son más frecuentes la sutura primaria y la reinserción de Iselin. En la acción secundaria la sutura simple es más rara. En muchos casos es necesaria la transferencia de tendón, la cual, de acuerdo con Bunnell se hace con la fascia-lata y su tejido adiposo periférico Aunque su acción es más fácil que la de los otros dedos, la operación no es sencilla, y requiere una buena técnica quirurgica, mucha experiencia y a menudo necesita incisiones auxiliares en la muñeca.

En la reparación del tendón usamos un procedimiento poco usual que consiste en la inserción de la vaina del flexor en la ultima falange Este método simplificado usando la vaina, ha dado buenos resultados, especialmente en los jóvenes. Otro tanto sucede con la unión del tendón transferido y la vaina aislada en la mano que dán una movilidad activa buena del pulgar Este método simplifica la operación y reduce el peligro de adherencias.

Dupuytren Contracture—The Results of Radical Fasciectomy MORTIMER H. SHAW, F R. C S., AND THOMAS L BARCLAY, F R. C S *From the Plastic Surgery Unit, St James Hospital, Leeds, England*

INTRODUCTION

Between 1947 and 1954 a standardised operative procedure (Mortimer H Shaw 1951) has been performed upon 157 hands in 135 patients suffering from Dupuytren s Contracture of varying degree The results have recently been assessed by "follow up in order to determine 1 The frequency of recurrence of the condition after radical fasciectomy, 2. The incidence of complications of the operation 3 The late results 4 The indications and contraindications for surgical treatment

To enable the results to be classified for further analysis a standard has been set as follows

a *A Good Result* A hand healed under a month from operation the patient returned to his usual occupation within three months with useful function developing a powerful grip and showing no recurrence within the field of operation.

b *A Poor Result* A hand showing residual stiffness or deformity weakness of grip associated with inability to perform his usual occupation, or recurrence in the field of operation.

The results of the follow-up study are appended in the following tables

TABLE I SEX DISTRIBUTION

135 Patients	
113 Male	22 Female

TABLE II AGE AT OPERATION

Age	20–30	30–40	40–50	50–60	60–70	70+
Operations	3	18	37	53	28	1

TABLE III. RECURRENCE

Recurrence within operative field	5
Recurrence outside operative field in the same hand	11

TABLE IV COMPLICATIONS OF OPERATION

Haematoma evacuated	22
of these skin graft required later	17
Delay in healing longer than a month but not grafted	10
Persistent oedema	9
Later amputation of a finger	4
Implantation cyst	3

the deeper tissues may also cause prolonged incapacity and it is most important that their treatment should be adequately supervised by some one trained in the handling of skin flaps and grafts It will be shown how the early efficient provision of skin cover in these cases, too, can reduce the time lost from work to an absolute minimum

It is now my intention to attempt an assessment of the relative merits of the various methods available to replace skin loss in digital injuries I feel it should be stressed at the outset that one cannot lay down hard and fast rules about the type of repair to be employed for a particular type of injury One must weigh up the various factors present in each case, not forgetting the type of work the patient undertakes For example, it is important to provide the skilled craftsman with supple skin of good sensation, whereas a labourer is more interested in a good functioning finger which will stand up to the stress of his work

Skin replacement in the fingers, as elsewhere, may be considered under

I Free graft replacement II Flap repair

(I) Free Grafts

The Thiersch graft has very limited application, only being used to cover areas of minor loss of skin It is not used when pulp or deeper tissues are also damaged

The full thickness (Wolfe) graft or the thick split skin (dermatome) graft have a limited use in the immediate replacement of skin loss The Wolfe graft is frequently used to replace the avulsed finger tip and recently, I reviewed the result in 50 cases The main conclusion to be drawn is that where the terminal phalanx has been involved in the injury a free graft on the whole has not given a satisfactory end to the finger The graft is adherent to bone, frequently tender on pressure and sometimes even hypersensitive This was so troublesome in four cases that a thenar flap replacement, was advised It is reasonable that when there has been loss of skin and subcutaneous tissue (pulp) both these elements should be replaced, i e by a flap

It might be argued that the advantages of a free graft on account of relative ease of performance and a shorter disability period might outweigh its disadvantages This view was not borne out in this series in which the treatment was largely undertaken by the casualty officers The average disability time was between 7 and 8 weeks This agrees closely with other reported series by Robins[1] and Barclay[2] These grafts, however meticulously undertaken, do take a considerable time to consolidate and this fact, no doubt, accounts for the relatively long disability period In our cases the grafts were taken from the arm or forearm under local anaesthesia and applied to the finger tip using digital nerve block The graft was held by tying the sutures, left long for the purpose, over a cotton wool bolster Sensation returned to the grafted finger tips in varying degrees The majority only regained crude sensation but in a few cases epicritic sensation returned The cosmetic appearance was poor particularly when there was bone loss The finger end was flattened or tapered due to shrinkage of the graft

Wolfe grafts or split skin grafts can be used elsewhere in digits provided there is a satisfactory bed The presence of bare tendon, bone without its periosteum and open joints preclude their use Sometimes, in clean traumatic avulsion of the finger tip, the avulsed end is preserved The end may be replaced as a free graft and it should take provided it consists only of skin and pulp In larger losses the end of the digit may be used as an autograft as described later

(II) Flap Repairs

(i) *Local flaps* The advancement and rotation flaps play little part in the replacement of skin loss in the digits but may occasionally be useful For example, in a recent case, I was able to rotate a flap from the dorsum of the finger to cover an exposed flexor tendon with a perfect functional result The donor site was covered with a split skin graft In skin loss on the thumb also, a rotation flap from the adjoining dorsal aspect of the hand can occasionally be most useful

(ii) *Thenar flap* In my opinion, this is the method of choice for the repair of the avulsed finger tip involving moderate loss of plup and bone It satisfactorily restores the loss of pulp as well as the skin Moreover, it provides skin of the right texture containing numerous tactile end organs so ensuring a satisfactory sensory reinervation This is particularly valuable to

La Maladie de Dupuytren—Les Résultats de la Fasciectomie Radicale MORTIMER W H SHAW ET THOMAS L BARCLAY

Une étude suivie de 157 opérations consécutives pour maladie de Dupuytren chez 135 malades et rapportée dans cet article On a dressé la liste de la fréquence des complications opératoires. De bons résultats ont été obtenus chaque fois que l on a *autorisé un usage normal de la main guérie dans* les 3 semaines On n eut pas à deplorer de com plications. Les complications ont été suivies de mauvais résultats la complication la plus impor tante étant l'hématome (28 cas) entraînant une perte de peau nécessitant le recouvrement par greffe (17 cas)

Die Ergebnisse Radikaler Fasziencxzision bei Dupuytrenscher Kontraktur MORTIMER W H. SHAW UND THOMAS L BARCLAY

Es wird über Nachuntersuchungen bei 157 Opera tionen von Dupuytren Kontrakturen bei 135 Pa tienten berichtet Die Häufigkeit der Komplika *tionen dieser Operationen wird aufgezählt. Gute* Ergebnisse traten ein, wenn die geheilte Hand nach drei Wochen wieder zu normaler Funktion ge-bracht wurde und Komplikationen nicht eintraten. Schlechte *Resultate folgen auf Komplikationen* deren wichtigste das Haematom (28) ist welches zum Verlust der Haut führt und eine Transplan-tation notwendig macht (17)

Contraccion de Dupuytren Resultados de la Fasciectomia Radical. MORTIMER W H *SHAW Y THOMAS L. BARCLAY*

Se hace un estudio continuado de 157 opera ciones consecutivas de contractura de Dupuytren La frecuencia de las complicaciones de la opera ción se anota. Se reportan buenos resultados cuando la mano curada se aplica a uso normal en tres semanas con lo cual no ocurren compli-caciones que son las que originan los resultados malos. La más frecuente fué hematoma, 28 casos, con lo cual en 17 huvo necrosis de piel que re-quirió injerto

---

The Immediate Replacement of Skin Loss in Digital Injuries.

DOUGLAS A. CAMPBELL REID M B F R C S *"Field Cottage Lime Avenue, Duf field, Derbyshire England*

This paper is based on experience gained in the early treatment of digital injuries at the Basingstoke Plastic Centre and the Derby Hand Surgery Service England.

Digital injuries associated with skin loss, unless treated early and adequately can be the cause of prolonged disability and loss to industry

Efficient immediate skin cover must be the aim in all such cases This will prevent sepsis allow clean healing and ensure an early return of function If there is associated damage to ten-dons, bones or joints, these injuries may be re-paired at the same time as appropriate skin cover is provided. A typical case to illustrate this point is shown (Fig. 378 top left) This patient caught his right ring finger in a machine and sustained a compound dislocation of the terminal interphalangeal joint division of the extensor tendon and skin loss over the dorsum of the finger The dislocation was reduced and held temporarily by means of a Kirschner wire driven across the joint surfaces the extensor tendon was repaired and immediate skin cover provided by means of an infraclavicular flap (Fig 378 top right) The flap was divided three weeks later the Kirschner wire removed and he regained excellent function in the finger (Fig 378 bottom)

In most hospitals in England, the less severe finger injuries are treated in the Casualty De-partment, often by junior resident staff These injuries, even if uncomplicated by damage to

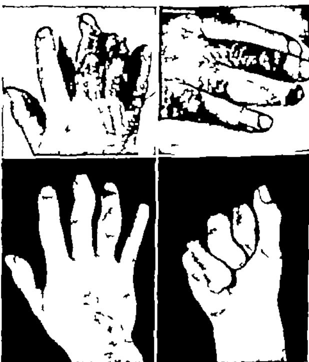


FIG 378 (top left) Initial condition of ring finger showing skin loss. Note that the middle finger was deformed from a previous injury (Top right) Dislocation of terminal joint reduced and held by Kirschner wire Chest flap attached. (Bottom) Functional result.

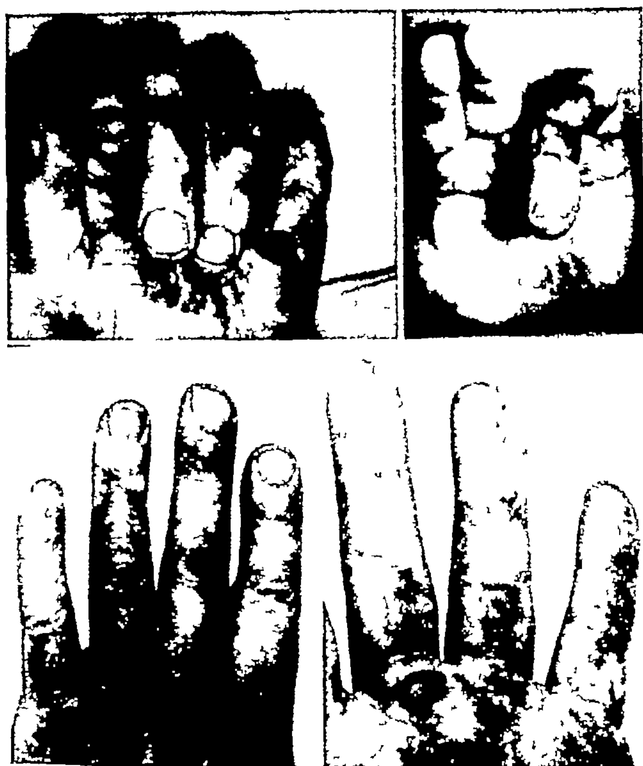


FIG 381 (top left) Traumatic amputation of tip of little finger (Top right) Cross-finger flap Donor area covered with split-skin graft (Bottom) End result Note restoration of terminal pulp



FIG 382 Combined thenar and cross-finger flaps for multiple injury This patient was a pianist and it was most important to conserve length in the fingers

is that of the forearm or arm Here, also, the skin is of good texture, but it does not possess the same number of tactile end organs The main disadvantage, however, of this type of repair is that the patient is considerably incommoded, not the least of which is the fact that he is unable to attend to himself for purposes of the toilet etc However, he is able to feed himself and can often be encouraged to shave himself This method is useful for the replacement of more extensive defects on the volar aspects of the fingers and also when more than one finger is involved (Fig 383) A single or double pedicle flap (bridge flap) may be used The latter has a double blood supply and each end may be divided at staged intervals This not only increases the safety of the flap but also reduces the time of the repair making it possible to divide one end as early as 10 days and the other at 2 to 2½ weeks

(v) *Chest flaps* The infraclavicular skin is the next most suitable donor site This skin has a reasonable texture though thicker than the sites previously mentioned One can raise comparatively large flaps or multiple flaps The disadvantages of the cross arm flap are obviated Fixation is easy and comfortable This area would not, of course, be used in female patients and for them the alternative is the submammary region Chest flaps are especially suited to replacing areas of loss over the dorsal aspect of the fingers Such losses frequently expose the extensor mechanism or one of the joints

Finally, I should like to mention the operation for immediate digital reconstruction following traumatic loss If the amputated digit has been preserved, it is a feasible proposition to regraft it using the method originally described by Gillies [3] and reported in a recent paper by Gillies and Reid [4] Briefly the procedure is as follows

The skin envelope is removed from the amputated portion which is then joined up to the stump by suturing the tendons and if possible the digital nerves This is then buried in a skin tube on the chest or opposite arm The nail bed is left intact Subsequently the flap is divided By this means the vital structures (bone, tendons and nail bed) are preserved and nerve suture should ensure a certain sensory

the skilled craftsman Results are vastly superior to those achieved by free grafts This repair has been criticised on the grounds that there may be persistent tenderness in the donor site but this has not been my experience. The site of the flap must be carefully planned and immediate grafting of the donor site performed using a split skin or full thickness graft. It is the treatment of choice in females who have lost the end of the finger as the cosmetic result is quite excellent (Fig 379) The flap can be adapted to replace larger areas of loss on the pulp by basing it laterally instead of proximally (Fig 380 left) I divide the flap after two weeks in all cases The average disability period in the last ten cases was 5 weeks Thus the period of incapacity is appreciably less than that in the series of free graft repair

(iii) *Cross-finger flap* This is the ideal repair to replace losses on the volar aspect of the finger particularly if the flexor tendons are exposed The flap is raised on the dorsal aspect of an adjoining finger and turned through 180 degrees (Fig 380 right) These flaps have an

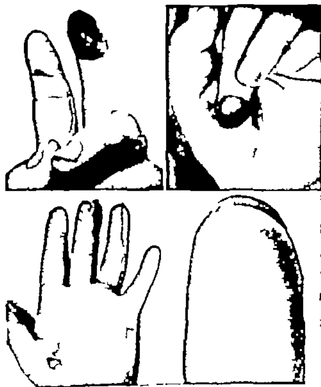


Fig. 379 (top left) Loss of finger tip which was injured in cabbage-shredding machine (Top right) Obliquely placed thenar flap (Bottom left) After division of the flap The donor area in the palm can be seen (Bottom right) Close-up view of finger tip showing restoration of contour





Fig 380 (top) Laterally based thenar flap for more extensive injury (Bottom) Cross-finger flap

excellent blood supply and will survive this acute angulation provided their base is sufficiently broad. The donor area should not encroach beyond the mid-lateral line. It is covered at the time with a free graft (preferably full thickness) and eventually this area becomes almost indistinguishable from normal Cross finger flaps may also be employed to replace the avulsed finger tip (Fig 381) or thumb tip These flaps like thenar flaps provide skin of perfect texture and skin that readily becomes reinnervated. Sometimes cross finger and thenar flaps may be combined in the same case for the repair of multiple injuries (Fig 382)

(iv) *Cross-arm flap* For reasons already stated, the ideal skin for replacing loss on the digits is the skin of the hand itself If this cannot be utilised, the next most suitable donor skin

asegurar un retorno rápido de la función, particularmente si los tendones, huesos y articulaciones estan lastimados En las lesiones menos severas, el período de incapacidad tambien puede ser reducido a un mínimo por un tratamiento eficiente similar

Se valorizan los distintos metodos de reemplazo de piel El metodo de reparación de las lesiones del pulpejo digital con injerto se considera inferior al de colgajo tenar cuando esta comprendido el hueso en la lesión (revisión de 50 casos) En la discusión de los diversos colgajos empleados (rotatorios, de dedo cruzado, tenar, brazo cruzado, pectoral) se hace particular enfasis sobre el sitio donador de piel adecuado

En amputaciones traumáticas, se discute el autoinjerto y se describe un caso de éxito Cuando esto falla, se describe un método de reconstrucción inmediata por pérdida traumática del pulgar, usando un colgajo tubulado e injerto óseo

---

Homoplastic Transplantations of Small and Large Entire Bones. PEDRO V PEDEMONTE, Dr, *Traumatological Institute, Montevideo, Uruguay*

The problem of homoplastic transplantation is of world-wide interest Some tissue transplantations are already real therapeutic conquests like those of cornea and cartilage Others, like those of nerves, arteries, skin and bones, are in the period of clinical experimentation Those of entire organs like kidneys, lungs and heart have not yet emerged from the stage of animal experimentation

A vast experience already exists with small fragments of homologous bone inserted as grafts in the interior of bones or in intimate contact with them

This has been possible, thanks to the creation of bone banks The experience is not so large with homotransplantation of bone into soft tissues Even less is the experience with homoplastic transplantation of small and entire bones We believe we are the first to have experimented with this kind of homoplastic transplantation and offer for your judgment the result of this experience

We have performed 26 homoplastic transplantations of small and large entire bones 12 phalanges (9 proximal and 3 mesial), 7 metacarpals (4 first, 2 second and 1 third), 4 metatarsals and 3 femurs The great majority of them were performed in the Traumatologic Institute, directed by Dr José Luís Bado

The first homoplastic transplantation of an entire small bone (a mesial phalanx) was performed on April 15th, 1951

The first transplantation of an entire femur was performed on August 8th, 1951, with Dr Rafael García Capurro The other two transplantations of femurs were by Professor Bado and his collaborators of the Traumatologic Institute

The homoplastic grafts are obtained and preserved under the well-known conditions for bone banks

We have performed these homoplastic transplantations in recent and old fractures, in pseudoarthrosis, in malignant tumors of bones, and in hydatid cyst

The conclusions and comments on our experience can be summed up in this manner

1 Primarily, both small and large entire bones "took" perfectly well if the transplantation was performed under the rigid surgical conditions required for every operative act and every graft from the point of view of immobilization

2 The early results are excellent If the bone which takes the place of the damaged one is identical in size—a phalanx or femur for instance—the morphology of the operated segment does not suffer any change and within the third week, once the operative wound has healed, the joints show an almost complete mobility, especially the phalanx and first metacarpal as may be appreciated by the illustrations

3 The late results—3 or 4 years—continue to be satisfactory No patients returned complaining of pain or any other annoyance and they only agreed to the consultation when impressed with the importance of checking the outcome Very discrete pain is observed and only with weather changes All of the patients retain their functions as workers The mobility of the joint has remained almost complete There is no loss of strength Morphological changes of variable intensity are observed Shortening, thickening or deviation may appear The radiographs show variable modifications in density of the transplanted bones These modifications as will be seen in the X-rays are morphological or structural and located specially at the epiphyses (Figs 385, 386, 387) These changes are slow in development, requiring a year more or less, and are especially noticeable in the phalanx and first



FIG. 383 (left) Multiple finger injuries sustained in concrete mixing machine (Center) Showing position of cross-forearm flaps. (Right) End result.

reinnervation Regrowth of the finger nail occurred in the case described

In loss of the thumb where the avulsed portion has not been preserved immediate reconstruction may be undertaken by tubing a flap on the chest wall and attaching one end to the thumb stump as a primary procedure (Fig. 384) A bone graft may also be inserted at this stage or subsequently In the case shown the patient regained excellent function and a surprising degree of sensation returned to the reconstructed thumb He was able to return to his normal occupation as a carpenter

ACKNOWLEDGMENTS

It is a pleasure to acknowledge the interest and encouragement of Sir Harold Gillies, Mr Patrick Clarkson and Mr Guy Pulvertaft. I also wish to thank Mr Pulvertaft for taking some of the *photographs*.

REFERENCES

1 Robins, R H C Brit J Surg 41 515 1954
2 Barclay T L Brit. J Plast. Surg., 8 38 1955
3 Gillies, H D Lancet, 1 1002 1940
4. Gillies H D and Reid D A C Brit J Plast. Surg., 7 338 1955

Le Remplacement Immédiat des Pertes Cutanées dans les Plaies des Doigts. DOUGLAS A. CAMPBELL REID

Il est essentiel de pouvoir recouvrir immédiatement avec de la bonne peau les doigts blessés de façon à obtenir une récupération fonctionnelle rapide surtout quand il y a eu des lésions tendineuses osseuses et articulaires Dans les traumatismes moins graves la période d'incapacité peut se trouver également réduite au minimum par un traitement efficace analogue

L'auteur se livre ensuite à une appréciation de diverses méthodes pour le remplacement de la peau. Il estime que *la réparation par greffe libre* dans les traumatismes de la pulpe digitale donne de moins bons résultats que le lambeau thénarien surtout quand l os a été touché (revue de 50 cas) *Dans la discussion des mérites des divers lambeaux* utilisés (lambeau par rotation, doigts croisés, lambeau thénarien bras croisés lambeau thoracique) l auteur insiste particulièrement sur la nécessité de convenance de la peau du donneur

Dans l amputation traumatique on discute de la greffe digitale et on décrit un cas où on a obtenu un succès. Enfin on indique une méthode de reconstruction immédiate pour la reconstruction de la perte du pouce méthode qui utilise un lambeau tubulé et un greffon osseux.

Der Sofortige Hautersatz bei Fingerverletzungen. DOUGLAS A CAMPBELL REID

Die Vorsorge für sofortige gute Hautbedeckung ist das primär Wesentliche zur Sicherung der frühen Wiederkehr der Funktion besonders, wenn Sehnen Knochen und Gelenke mitbetroffen sind Auch bei den weniger schweren Verletzungen kann die Invaliditätsperiode durch eine ähnlich wirkungsvolle Behandlung auf ein Minimum reduziert werden

Die verschiedenen Methoden des Hautersatzes werden bewertet. Hautersatz durch freie Transplantation bei Fingerspitzenverletzungen wird als weniger gut gegenüber dem Daumenballenlappen betrachtet, falls der Knochen beteiligt ist (Übersicht über 50 Falle) Bei der Besprechung der verschiedenen angewandten Lappen (Rotationslappen gekreuzte Arm und Brustlappen, gekreuzter Fingerlappen, Daumenballenlappen) wird besonderer Wert auf die Brauchbarkeit der Haut der Entnahmestelle gelegt.

Bei traumatischen Amputationen wird die Autotransplantation von Fingern besprochen und ein erfolgreicher Fall beschrieben. Bei Versagen dieser Methode wird eine Methode sofortiger Wiederherstellung bei Daumenverlust besprochen, bei der ein Rundstiellappen und ein Knochentransplantat benutzt werden.

Reemplazo Inmediato de las Pérdidas de Piel en las Lesiones Digitales. DOUGLAS A. CAMPBELL REID

El suministro de una cubierta buena de piel inmediata, es la primera medida esencial para

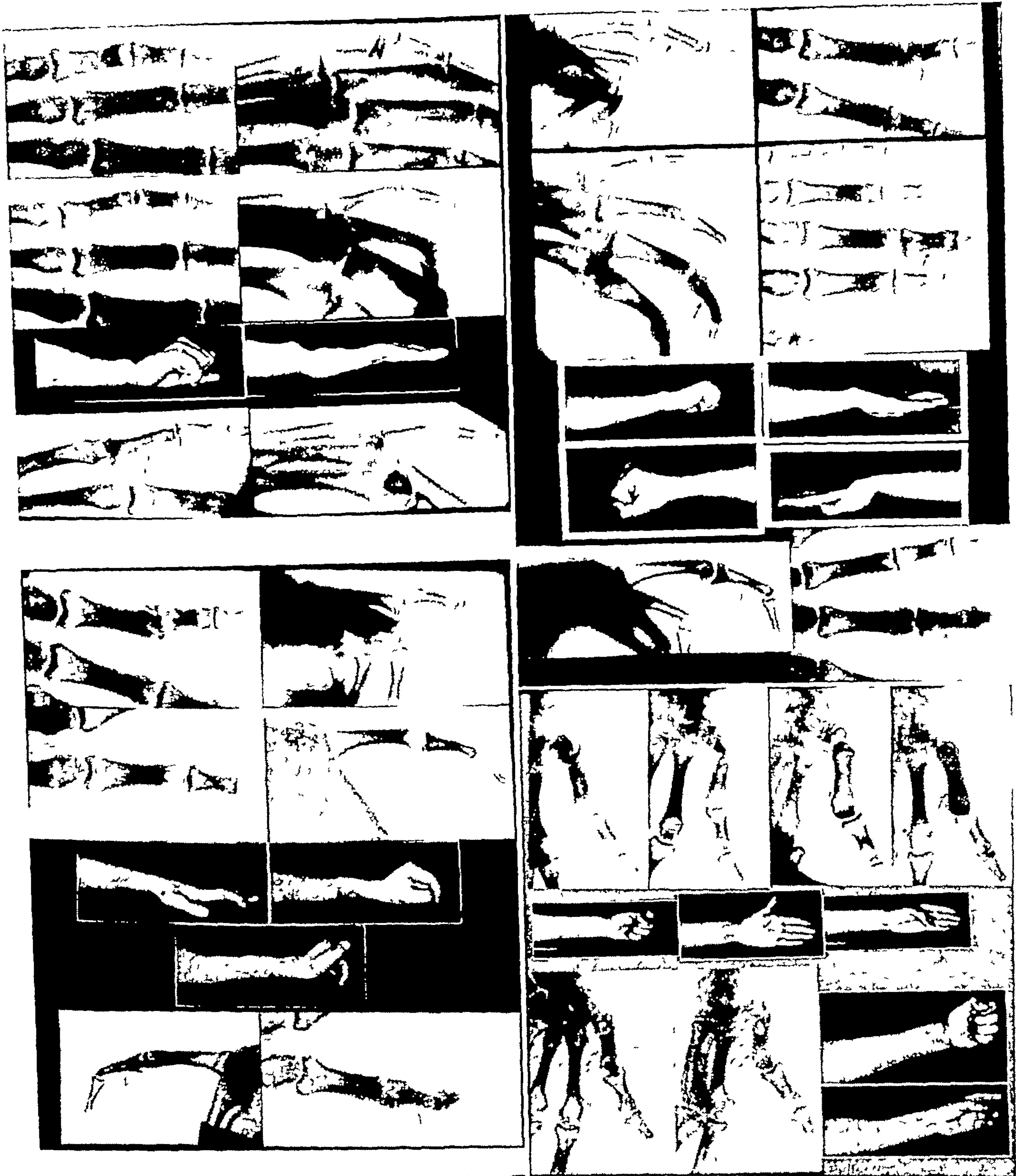


Fig 385 (upper left) Diaphyseal grown old fracture of the proximal phalanx of the little finger with adherence of flexor tendons treated with homoplastic transplantation Excellent early results Discrete modification within 3 years (Upper right) Epiphyseal fracture and luxation of mesial phalanx of the middle finger grown old during two months Homoplastic transplantation Excellent early results Discrete modification within 3 years (Lower left) Epiphyseal grown old fracture and luxation of the mesial phalanx of the fore-finger Homoplastic transplantation Early result good Within 3 years noted phenomena of modification (Lower right) Pseudoarthrosis of the first metacarpal Homoplastic transplantation Excellent early result Within 4 years note phenomena of modification, but a good clinical result is still conserved

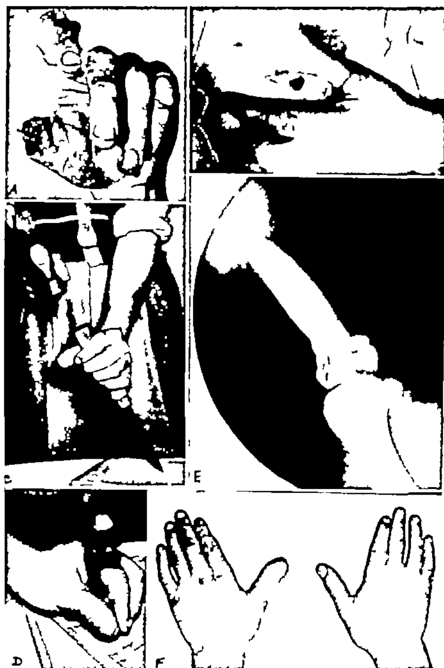


FIG. 384. (A) Traumatic amputation of thumb Note also division of extensor tendon to index finger (B) Immediate reconstruction by tubed flap from chest wall (F) Reconstructed thumb (E) Bone graft in situ, taken from ulna (C and D) Funtional result

metacarpal. The large bones such as the femur also suffer the action of this process and after four years we have noticed that there also exist structural modifications The resistance of the transplanted bone is maintained after four years

The first transplantation of an entire femur was performed nearly four years ago (Fig 388) The radiographic modifications are evident but the resistance of the bone was so good that the patient could maintain his function as a railway brakeman until two months ago when he suffered a very violent trauma in a collision of trains and thus suffered a fracture of the shin bone of the limb in which the transplantation had been performed. Besides in the same accident he sustained a fracture of the neck of the transplanted femur This type of fracture, as you know sometimes occurs spontaneously in normal persons.

4. The homoplastic transplantations of bone placed in the midst of soft tissues that is like islands about the skeleton without direct con-



Fig 387 (left) Malignant tumor Osteoblastoma of the first metacarpal Total resection and homoplastic transplantation of a metacarpal with arthrodesis at its proximal extreme Within 2 years excellent radiographic and clinical result (Right) Hydatidinous cyst of the superior end of the femur Whole resection of femur and homo transplantation Six months later excellent result

tact with the bones are, as far as we were able to observe, those which suffer the greatest modifications But when they are placed in intimate contact with the skeleton, as in case No 9, they are united to the neighbor bone by osseous callus and seem to incorporate definitely with the organism

The method of homoplastic transplantation of small and large entire bones is a new therapeutic venture It is superior to the inert prosthesis, as shown by its satisfactory late results after four years Nevertheless, a longer clinical observation and a more abundant trial will be necessary for definite conclusions to be reached

Traumatological Institute
Lazaro Gadea 976
Montevideo, Uruguay

Greffes Homoplastiques d'os Entiers Petits et Grands. Pedro Pedemonte

Au cours des 5 dernières années, l'auteur a greffé des phalanges, des métacarpiens, des métatarsiens et des fémurs prélevés sur des cadavres Il remplace selon les besoins des petits ou des grands os Il a ainsi greffé 15 phalanges, 12 métacarpien, 1 métatarsien et 3 fémurs Jusqu'a maintenant les opérations ont été exécutées par des fractures des tumeurs ou des kystes Les résultats ont été des plus satisfaisants à ce jour

Homotransplantation Ganzer, Kleiner und Grosser Knochen. Pedro Pedemonte

Wahrend der letzten funf Jahre haben wir Phalangen, Metacarpal-, Metatarsal- und Oberschenkelknochen von Leichen transplantiert Wir ersetzen kleine oder grosse Knochen, wie es der Fall erfordert Wir haben 15 Phalangen, 12 Metacarpalknochen, 1 Metatarsalknochen und 3 Oberschenkelknochen transplantiert Bisher gaben Frakturen, Tumoren oder Cysten die Veranlassung fur die meisten Operationen Bisher waren alle Ergebnisse sehr befriedigend

Transplantacion Homoplastica de Huesos Grandes y Pequeños. Pedro Pedemonte

En los últimos cinco años hemos injertado falanges, metacarpos, metatarsos y fémures obtenidos de cadáveres Substituímos huesos pequeños o grandes según sea necesario Hemos injertado quince falanges, doce metacarpianos, un metatarsiano y tres fémures Hasta la fecha la

---

the hand and pseudoarthrosis of the third and fourth metacarpus by homoplastic transplantation of metacarpal (Lower right) Even more grave lesion of the metacarpus, total loss of the skin of the dorsum of the hand, of extensor tendons and of the four last metacarpal Repair of the skin as in previous case Repair of the metacarpus by homoplastic transplantation As we had no metacarpal at that moment, we had to use two metatarsal

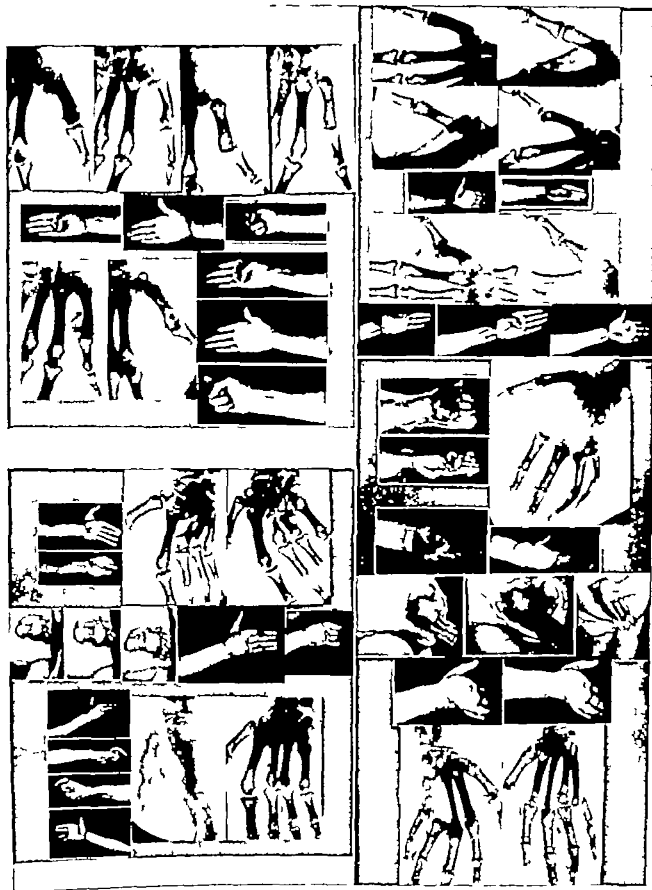


FIG. 396 (upper left) Bennett's fracture. Homoplastic transplantation. Excellent early result. Within 4 years discrete modification, yet good clinical result. (Upper right) A similar case to the preceding. (Lower left) Very grave lesion of the metacarpus Sequela retractile scar of the dorsum of

sults obtained in patients occupied in the most variable tasks and treated by different methods

We have now codified the technical procedures to be followed in the different cases considering particularly the age, profession and intelligence of injured persons

Although we do not stick to a rigid schema we believe that three possibilities should be kept in mind by the surgeon who begins to treat traumatic lesions of the hand due to work casualty

1 The possibility that after surgical recovery the injured person can continue in his previous occupation

2 The necessity to resort to very large amputations which will necessitate, after reeducation, different work for the injured person

3 The opportunity, in case of extensive lesions, to apply every technical possibility to afford the injured person even a moderate autonomy

There are other technical points that we believe should be kept in mind

The good results which are usually obtained by thick dermo-epidermal grafts on the dorsum of the hand and fingers and the possibility of residual dystrophic or painful aging in the palmar surface of the hand or in the fingers (in cross finger technic) when extensive grafts are taken from such areas

For the aforementioned reasons our attitude is influenced by these main points

In young apprentices we employ the most conservative treatment possible, because it is

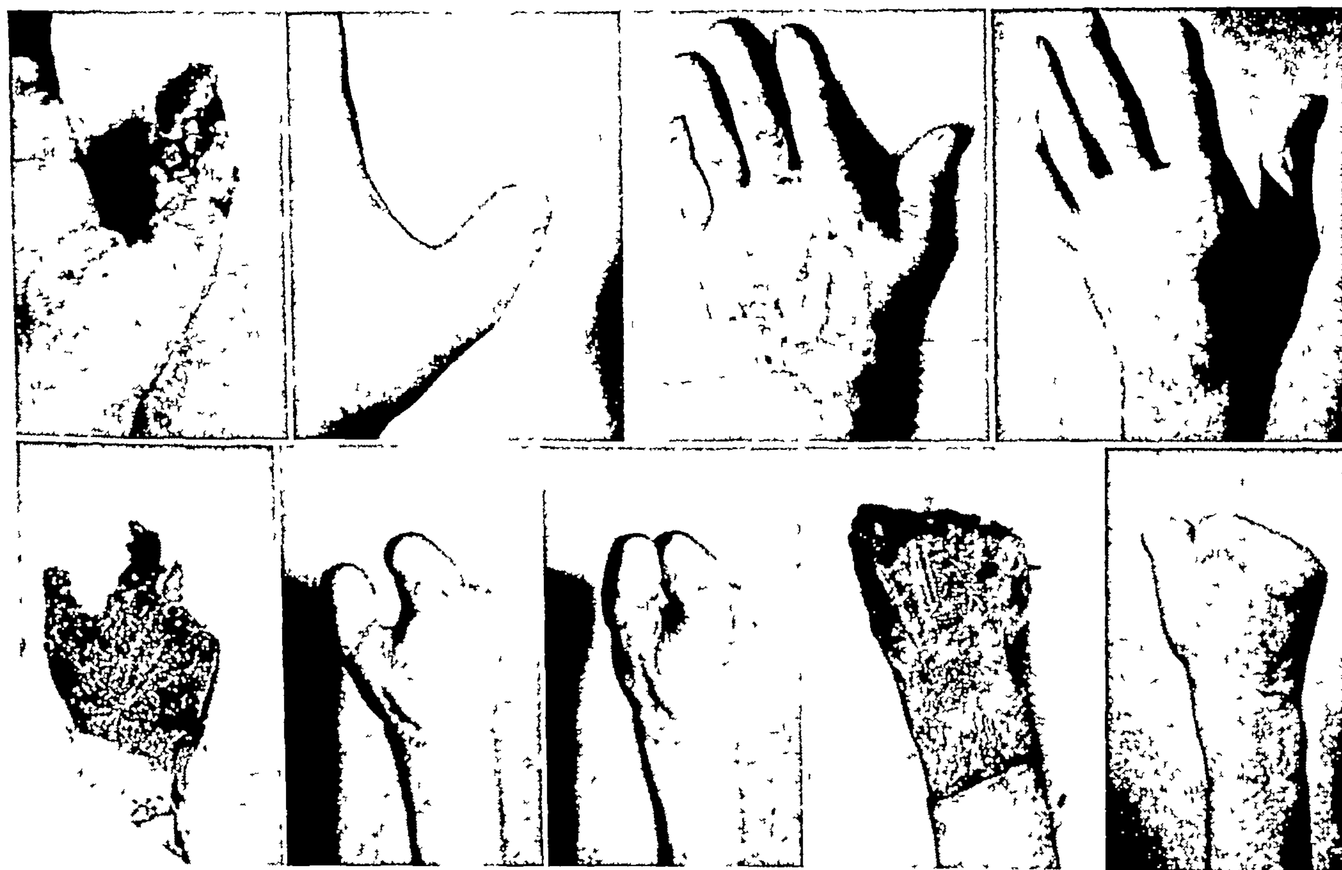


FIG 389 (upper left) In septic wounds of the fingers, complicated by osteomyelitis, it is often possible to preserve considerable portions of bone by transferring, from the abdomen, a small flap to cover the raw surface following the excision of all soft necrotic parts (Upper right) In septic wounds of the dorsum of the hand, with large skin losses and exposition and infection of the extensor tendons, the treatment by immediate flap from the abdomen allows us, very often, to preserve the function of the extensor tendons (Lower left) In the avulsion of a complete gauntlet of skin from the hand, when some of the stumps are preserved and we think that these stumps will be able to hold objects, we immediately cover the raw surface with a split graft, successively a double pedicle flap from the abdomen is raised and transferred in order to insure to the tip of the stumps a more reliable kind of skin (Lower right) In cases in which no stumps remain, we proceed in the same way covering the loss by split grafts and, later, transferring a tube flap from the abdomen in order to accomplish the phalangization of the thumb metacarpal

indicación operatoria ha sido por fracturas tumores y quistes. Los resultados a la fecha son satisfactorios

---

Skin and Bone Grafts in Reconstructive Surgery of the Hand for Occupational Casualties. INNOCENZO CLERICI-BAGOZZI M D *From the I N A I L Plastic Department—Nuovo Ospedale Maggiore—Milano, Italy*

The treatment of traumatic lesions of the hand is gaining an ever greater importance both for the continuous increase of casualties of the hand, and for the technical possibilities offered by modern plastic reconstructive-surgery



FIG 388 Extensive hydatid cyst of entire femur Complete resection of femur and homotransplantation within 6 months Patient s photographs 6 months. VI VII VIII 18 months later XI XII XIII 4 years later showing the fracture of the flat surface of the shin-bone and the neck of the transplanted femur

As a matter of fact crash injuries and lesions that would require the sacrifice of still viable skeletal or muscular parts to enable closure of the wound by immediate suture are more and more frequent.

In such cases skin and bone grafts can reduce considerably the loss of working power and make less serious the consequences of extensive mutilations

As aforementioned the improvement of the technicalities of plastic and reconstructive surgery in the treatment of traumatic injuries of the hand give to the surgeon the means of choice *from the wide range of operations*

This notwithstanding the surgical success and the functional recovery obtained thanks to skin grafts allows only a manual activity which does not expose the grafts to too rough functional efforts.

One must never forget that cutaneous transplants if the graft comes from another area of the body never show the same grade of strength typical of the skin of the hand, while grafts taken from palmar or digital areas evoke the problem of epithelisation of the donor area.

Such details are of little importance when the *patient is a clerk, or has a commercial activity* whilst they are of great importance for workmen or peasants

Owing to the fact that the greatest part of traumatic injuries of the hand happens amongst the second group of working people we have investigated among the modern methods which are the best ones to reduce to a minimum both the period of temporary disability and the final loss of working power

Our task has been greatly helped by the fact that in Italy every workman is insured for all work casualties which may occur

The Insurance Institution takes care of the injured person up to surgical and functional recovery and grants a daily indemnity during this period and a life indemnity proportional to the loss of working power in the case this is greater than 11 per cent

Finally the institution takes care of the re-education and rehabilitation of the casualties who have a loss of working power of more than 50 per cent.

Repeated check examinations for insurance purposes, have enabled us to evaluate the re-

sults obtained in patients occupied in the most variable tasks and treated by different methods

We have now codified the technical procedures to be followed in the different cases considering particularly the age, profession and intelligence of injured persons

Although we do not stick to a rigid schema we believe that three possibilities should be kept in mind by the surgeon who begins to treat traumatic lesions of the hand due to work casualty

1 The possibility that after surgical recovery the injured person can continue in his previous occupation

2 The necessity to resort to very large amputations which will necessitate, after reeducation, different work for the injured person

3 The opportunity, in case of extensive lesions, to apply every technical possibility to afford the injured person even a moderate autonomy

There are other technical points that we believe should be kept in mind

The good results which are usually obtained by thick dermo-epidermal grafts on the dorsum of the hand and fingers and the possibility of residual dystrophic or painful aging in the palmar surface of the hand or in the fingers (in cross finger technic) when extensive grafts are taken from such areas

For the aforementioned reasons our attitude is influenced by these main points

In young apprentices we employ the most conservative treatment possible, because it is

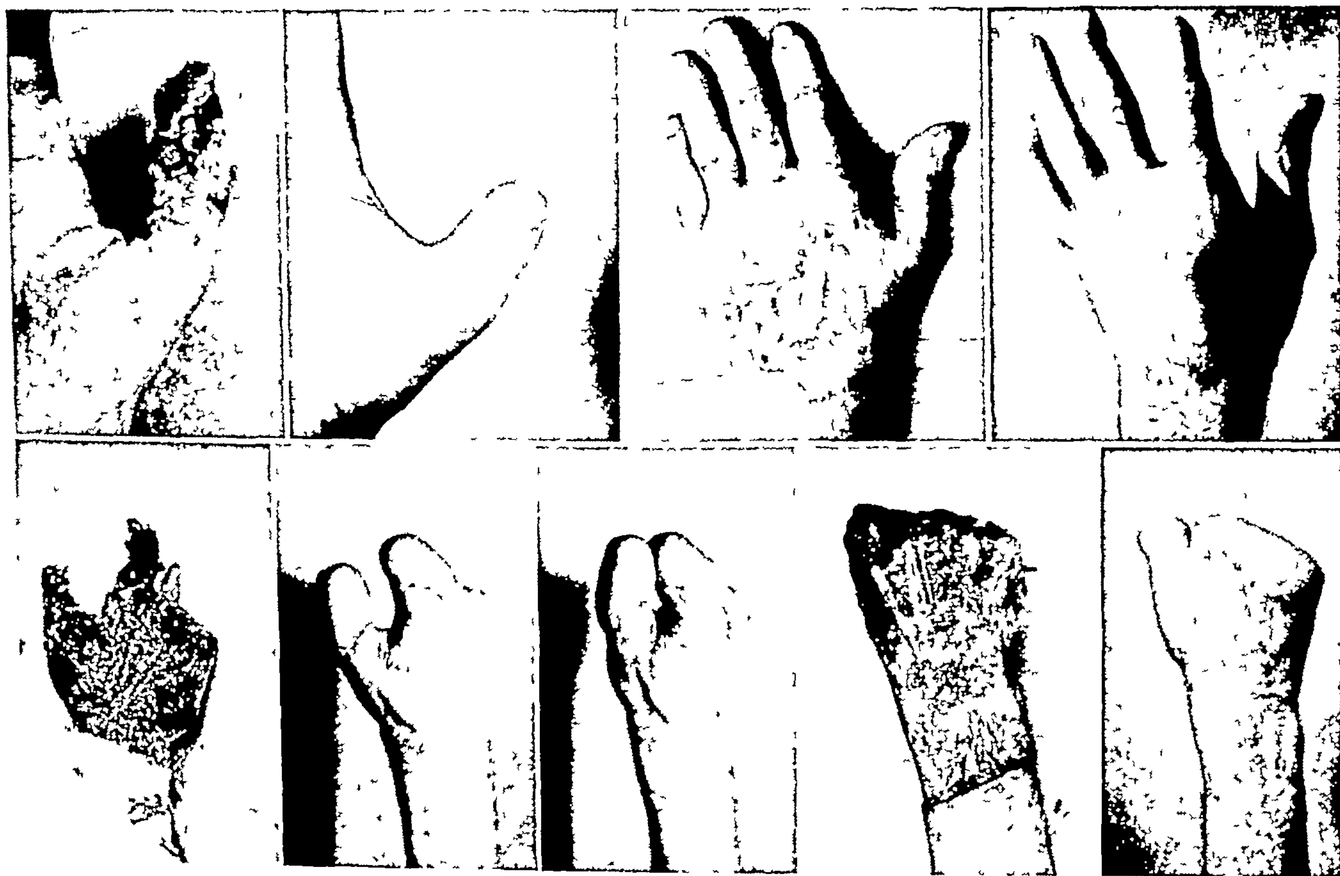


FIG 389 (upper left) In septic wounds of the fingers, complicated by osteomyelitis, it is often possible to preserve considerable portions of bone by transferring, from the abdomen, a small flap to cover the raw surface following the excision of all soft necrotic parts (Upper right) In septic wounds of the dorsum of the hand, with large skin losses and exposition and infection of the extensor tendons, the treatment by immediate flap from the abdomen allows us, very often, to preserve the function of the extensor tendons (Lower left) In the avulsion of a complete gauntlet of skin from the hand, when some of the stumps are preserved and we think that these stumps will be able to hold objects, we immediately cover the raw surface with a split graft, successively a double pedicle flap from the abdomen is raised and transferred in order to insure to the tip of the stumps a more reliable kind of skin (Lower right) In cases in which no stumps remain, we proceed in the same way covering the loss by split grafts and, later, transferring a tube flap from the abdomen in order to accomplish the phalangization of the thumb metacarpal

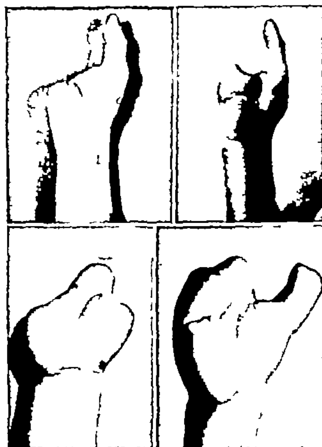


FIG 390 (top) In this case the suture of the skin edges was probably performed at the expense of large amounts of bone the patient wished to be able to drive a motor-scooter for delivery purposes. The transplanted skin and bone grafts formed a mass which gave an efficacious holding on the handle (Bottom) In this case the injured woman asked to be enabled to nip to work later on a knitting machine the plastic reconstruction, by means of skin and bone grafts made it possible to accomplish her wish.

obligatory owing to the fact that they are not as yet well qualified workmen not to reduce the possibilities of future occupation in a different field of work.

In older people we take into great consideration the necessity for the injured person to return to his usual job owing to the fact that it would be very difficult for him to find another kind of work.

In the cases in which there are preexisting mutilations and in which a further shortening could considerably compromise the gripping power we proceed to plastic reconstruction, independently of the age and profession of the injured person.

Summarising we can therefore point out the schema to which generally we hold in the treatment of recent traumatic injuries of the hand.

1 *Skin loss of the pulp of the fingers* in young people we cover the loss of tissue by a palmar flap if the lesion is limited, or by an immediate thoracic flap if the loss is of a certain extent in non-qualified workmen we prefer to amputate utilising preferably, for the covering of the stump a palmar or lateral flap from the same affected finger

2 *Skin losses of the flexor aspect of the fingers with conservation of the pulp and of the tendons* in young apprentices and in specialised workmen we proceed to the reconstruction by means of the cross-fingers technic or by immediate thoracic or pectoral graft, whilst in elderly people and in non-qualified workmen, we prefer here again, amputation.

3 *Amputation of the thumb at the first phalanx* in the young or specialised workmen we proceed to the immediate closure of the wound by means of a thoraco-pectoral graft, whilst in non-specialised workmen we prefer to obtain a primary skin suture by shortening of the bone.

4. *Total loss of thumb* in the young apprentices we prefer reconstruction by a bone graft covered by a tubular skin flap in elderly or in not qualified workmen we prefer the use of a prosthesis.

5 *Total loss of the skin of the palm of the hand with conservation of that of the fingers* in all cases immediate grafting of the injured area by an abdominal flap

6 *Total loss of the skin of the hand with conservation of digital stumps still capable of gripping* in such cases we use an immediate thick dermo-epidermal graft on all the raw area and, successively we transfer from the abdomen a tubed flap to cover the stumps of the fingers.

7 *Total loss of the skin of the hand and total traumatic amputation of the fingers* in this case after immediate dermo-epidermal graft we proceed to transfer a tubed flap from the abdomen, to enable us successively to proceed to the phalangisation of the first metacarpal.

In the treatment of the sequelae of hand traumatic injuries we stick to these principles

1 *Septic wounds of fingers with osteomyelitis* in young and specialised workmen we try to reduce the anatomical loss to a minimum especially of the thumb by transferring an immedi-



FIG 391 (top) For the bone graft usually we employ cancellous bone from crest of ilium fixed very firmly with a screw penetrating the medullary canal, by these means it is possible to obtain a good fixation avoiding the use of splints or of plaster of Paris for long periods (Bottom) In this case we proceeded to plastic reconstruction on aesthetic and cosmetic purposes, because this unfortunate girl, who was not able to bear the sight of her stumps, had an hysterical crisis each time bandage was undone The treatment obtained a lengthening of the index and middle fingers and, with a complete recovery from the hysterical syndrome, a remarkable aesthetic improvement by application of artificial nails

ate flap from the abdomen or from the pectoral region, in non qualified workmen and in peasants, we amputate, so as to obtain a soft stump

2 *Septic wounds of the dorsum with skin loss and exposure of the extensor tendons* in such cases we proceed to cover the raw area with an abdominal flap

3 *Retractile scars of the fingers with conservation of the pulp and of the tendons.* we employ a full thickness skin graft or a cross finger flap according to the extent of the lesion, if the patient is young or a qualified workman; in the other cases we prefer amputation, especially if it allows the conservation of the first phalanx

4 *Retractile scars of the palm with conservation of the tendons* we adopt a skin graft from the abdomen, by means of a tubed flap primarily transferred to the wrist

5 *Severely mutilating lesion of the hand* we prefer to obtain a recovery of the gripping power by means of bone grafts covered by tubular skin transplants, osteosynthesis is usually obtained by screwing

SUMMARY

A review is made of the criteria for the application of skin and bone grafts to the hands of injured workers on the basis of personal experience of the A

Corso Buenos Aires 17
Milano Italy

Les Greffes Cutanées et Osseuses dans la Chirurgie Reconstructive de la Main Après Accident du Travail INNOCENZO CLERICI BAGOZZI

Un grand nombre de lésions traumatiques de la main se produisent dans les usines ou au cours du travail aux champs

Fréquemment dans les blessures digitales les moins graves la guérison obtenue à l'aide de greffe cutanée ne permet pas un travail normal

Après examen des données statistiques fournies par la compagnie d'assurance INAIL on fait une évaluation des différentes éventualités les plus fréquemment rencontrées et l'auteur donne des suggestion pour une guérison bonne et rapide en se basant sur son expérience personnelle

On insiste sur la nécessité d'une prise rapide des greffes osseuses dans les cas de mutilation grave pour permettre de restaurer dans certaines limites la morphologie de la main et de lui donner un certain degré de préhensibilité on obtient facilement de bons résultats en fixant les greffons par des vis en vilatium.

On démontre également les possibilités qu'offrent les lambeaux cutanés dans le traitement des lésions septiques

Über Haut und Knochentransplantationen in der Plastischen Chirurgie der Hand nach Berufsunfällen. INNOCENZO CLERICI BAGOZZI

Zahlreiche Handverletzungen kommen in Fabriken oder bei der landwirtschaftlichen Arbeit vor

Bei weniger schweren Fingerverletzungen gestattet die Heilung die durch Hauttransplantation erzielt wurde später keine normale Arbeit mehr

Nach einer Durchsicht statistischer Unterlagen die von der Inail Insurance Company zur Verfügung gestellt wurden wurde eine Auswertung der verschiedenen häufiger vorkommenden Fälle vorgenommen und es wurden Vorschläge für eine gute und schnelle Heilung auf Grund der eigenen Erfahrungen des Autors gemacht

In Fällen von schweren Verstümmelungen wurde die Notwendigkeit schneller Einheilung von Knochentransplantaten betont um innerhalb gewisser Grenzen die anatomische Form der Hand und einen gewissen Grad von Griffähigkeit wieder herstellen zu können Gute Ergebnisse wurden leicht durch Fixation des Transplantates mit Vitallium-schrauben erzielt.

Auch wurden die Möglichkeiten, die durch Hautlappen bei der Behandlung septischer Läsionen gegeben sind demonstriert.

Injertos de Piel y Hueso en Cirugía Reconstructiva de la Mano Despues de Accidentes de Trabajo. INNOCENZO CLERICI BAGOZZI

Durante el trabajo diario en fábricas y en el campo ocurren en gran numero de lesiones traumáticas de la mano

En las lesiones digitales menos severas frecuentemente la recuperación obtenida por medio de injertos de piel no permiten trabajo normal.

Después de examinar datos estadísticos suministrados por la INAIL Insurenve Company se hace una apreciación de los diversos casos que ocurren mas frecuentemente y se sugieren ideas para una rapida y mejor recuperación tomando como base la experiencia personal del autor

En casos de mutilaciones serias para restaurar hasta ciertos límites la morfología de la mano y hasta cierto grado de capacidad prensil es imperiosa la necesidad de integración rápida de injertos óseos Se obtiene buenos resultados fijando injertos por clavos de vitalium.

Se demuestran también las posibilidades de usar colgajos de piel en el tratamiento de las lesiones sépticas

---

Methods of Re-establishing Amputated Fingers. BJARNE GRUNDT M D, *Drammensveien 23 Oslo, Norway*

As it often happens that an amputated finger and one's occupation go down the drain together it is desirable to preserve an amputated finger

In January 1951 I therefore devised a method, that has later often been used with good results.

A short account of the method is as follows

The amputated finger is cleaned, the skin removed and transplanted to the thigh for later use on the new finger The nail and some of the

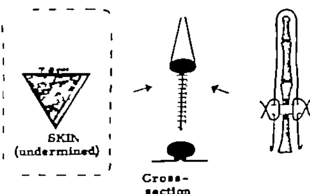


FIG 392 Shows the elevated triangle of the abdomen 3 inches each side the undermining and then the suture which automatically forms the bag which totally surrounds the amputated finger In this way nutrition is obtained from all directions Finally the osteosynthesis and the suture of the edge of the bag to the skin of the stump



Fig 393 Two amputated reestablished fingers in their bags

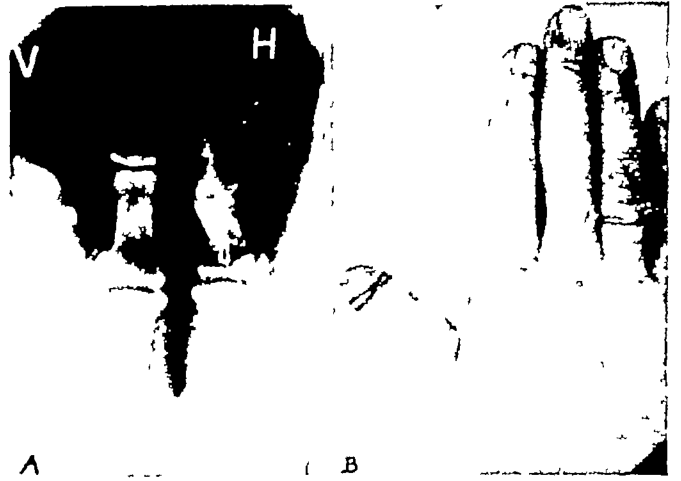


Fig 395 (left) One of my first amputated fingers from 1951 The osteosynthesis (Right) The end result 4 months later The rings mark the return of sensation up to that time

fat are thrown away The blood vessels, nerves and extensor tendons are preserved, but the distal ends of the flexor tendons are removed, as far as the distal joint An osteosynthesis is performed to establish normal position, and if possible tendons and nerves are sutured

On the abdomen a bag of skin is formed, including as little as possible of the fat The skin of the proximal stump is sutured to the skin

Fig 394 A Amputated 3rd finger, the 4th one was lost B The method of osteosynthesis which I now prefer C The result, 6 weeks later

SUMMARY

A review is made of the criteria for the application of skin and bone grafts to the hands of injured workers on the basis of personal experience of the A

Corso Buenos Aires 17
Milano Italy

Les Greffes Cutanees et Osseuses dans la Chirurgie Réconstructive de la Main Apres Accident du Travail. INNOCENZO CLERICI BAGOZZI

Un grand nombre de lésions traumatiques de la main se produisent dans les usines ou au cours du travail aux champs

Fréquemment dans les blessures digitales les moins graves la guérison obtenue à l aide de greffe cutanée ne permet pas un travail normal

Apres examen des données statistiques fournies par la compagnie d assurance INAIL on fait une évaluation des différentes éventualités les plus fréquemment rencontrées et l auteur donne des suggestions pour une guérison bonne et rapide en se basant sur son expérience personnelle

On insiste sur la nécessité d une prise rapide des greffes osseuses dans les cas de mutilation grave pour permettre de restaurer dans certaines limites la morphologie de la main et de lui donner un certain degré de préhensilité on obtient facilement de bons résultats en fixant les greffons par des vis en vitalium

On démontre également les possibilités qu offrent les lambeaux cutanés dans le traitement des lésions septiques.

Über Haut und Knochentransplantationen in der Plastischen Chirurgie der Hand nach Berufsunfällen INNOCENZO CLERICI BAGOZZI

Zahlreiche Handverletzungen kommen in Fabriken oder bei der landwirtschaftlichen Arbeit vor

Bei weniger schweren Fingerverletzungen gestattet die Heilung, die durch Hauttransplantation erzielt wurde später keine normale Arbeit mehr

Nach einer Durchsicht statistischer Unterlagen die von der Inail Insurance Company zur Verfügung gestellt wurden, wurde eine Auswertung der verschiedenen, häufiger vorkommenden Fälle vorgenommen und es wurden Vorschläge für eine gute und schnelle Heilung auf Grund der eigenen Erfahrungen des Autors gemacht

In Fällen von schweren Verstümmelungen wurde die Notwendigkeit schneller Einheilung von Knochentransplantaten betont um innerhalb gewisser Grenzen die anatomische Form der Hand und einen gewissen Grad von Griffähigkeit wieder herstellen zu können Gute Ergebnisse wurden leicht durch Fixation des Transplantates mit Vitalliumschrauben erzielt.

Auch wurden die Möglichkeiten die durch Hautlappen bei der Behandlung septischer Läsionen gegeben sind demonstriert.

Injertos de Piel y Hueso en Cirugia Reconstructiva de la Mano Despues de Accidentes de Trabajo INNOCENZO CLERICI BAGOZZI.

Durante el trabajo diario en fábricas y en el campo ocurren en gran numero de lesiones traumáticas de la mano

En las lesiones digitales menos severas, frecuentemente la recuperación obtenida por medio de injertos de piel no permiten trabajo normal

Después de examinar datos estadísticos suministrados por la INAIL Insurance Company se hace una apreciación de los diversos casos que ocurren más frecuentemente y se sugieren ideas para una rapida y mejor recuperación tomando como base la experiencia personal del autor

En casos de mutilaciones serias para restaurar hasta ciertos límites la morfología de la mano y hasta cierto grado de capacidad prensil es imperiosa la necesidad de integración rápida de injertos óseos Se obtiene buenos resultados fijando injertos por clavos de vitalium.

Se demuestran también las posibilidades de usar colgajos de piel en el tratamiento de las lesiones sépticas

---

Methods of Re-establishing Amputated Fingers. BJARNE GRUNDT, M D, *Drammensveien 23, Oslo Norway*

As it often happens that an amputated finger and one s occupation go down the drain together it is desirable to preserve an amputated finger

In January 1951 I therefore devised a method, that has later often been used with good results.

A short account of the method is as follows

The amputated finger is cleaned the skin removed and transplanted to the thigh for later use on the new finger The nail and some of the

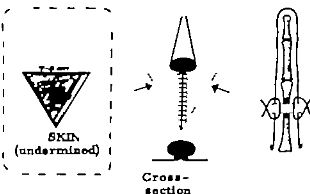


FIG 392 Shows the elevated triangle of the abdomen 3 inches each side the undermining and then the suture which automatically forms the bag which totally surrounds the amputated finger In this way nutrition is obtained from all directions. Finally the osteosynthesis and the suture of the edge of the bag to the skin of the stump

cause the skin of the abdomen is of a poorer quality, with far fewer nerve endings In many cases I therefore put a toe on to the tip of the reestablished finger to get nearly perfect sensation and also a nail

A second method I have used where the whole thumb is lost, is partially a modification of Mr Moore's method, where the bone graft is not put in on the tip, but somewhat proximal, as the scar tissue of the tip withstands pressure better that way

Later, the 2nd toe is moved up, to get better sensation and also a nail Illustrated in Fig 396

Another method of reestablishing a thumb, if the skin over the amputated thumb is not usable, is to swing out a suitable flap of skin, including an earlier implanted bone graft, from the radial side of the 2nd finger, over the stump of the thumb, and later lengthen it with a toe Illustrated in Fig 397 and 398



FIG 397 A A thumb torn away by a propeller B The transplanted bone C The end result with the second toe on the tip

Methodes pour le Rétablissement des Doigts Amputés. BJARNE GRUNDT.

On nettoie le doigt amputé, on enlève la peau et on la greffe sur la cuisse pour l'utiliser plus tard lors de la reconstruction du doigt On sacrifie l'ongle et une partie du tissu graisseux et on pratique l'exérèse des tendons fléchisseurs à leur point d'attache supérieur On conserve par contre les vaisseaux sanguins, les nerfs et les tendons extenseurs Une ostéosynthèse rétablit une position correcte et on suture si possible les nerfs et les tendons

Le doigt est inclus et suturé dans un lambeau abdominal on applique un plâtre Au bout de trois semaines, on libère le doigt et on le façonne, trois mois plus tard on fait une greffe de tendons fléchisseurs et d'ongle Puis on retransplante la peau originale de la cuisse au doigt La sensibilité revient lentement elle est toujours réduite et le doigt reste froid pendant des mois

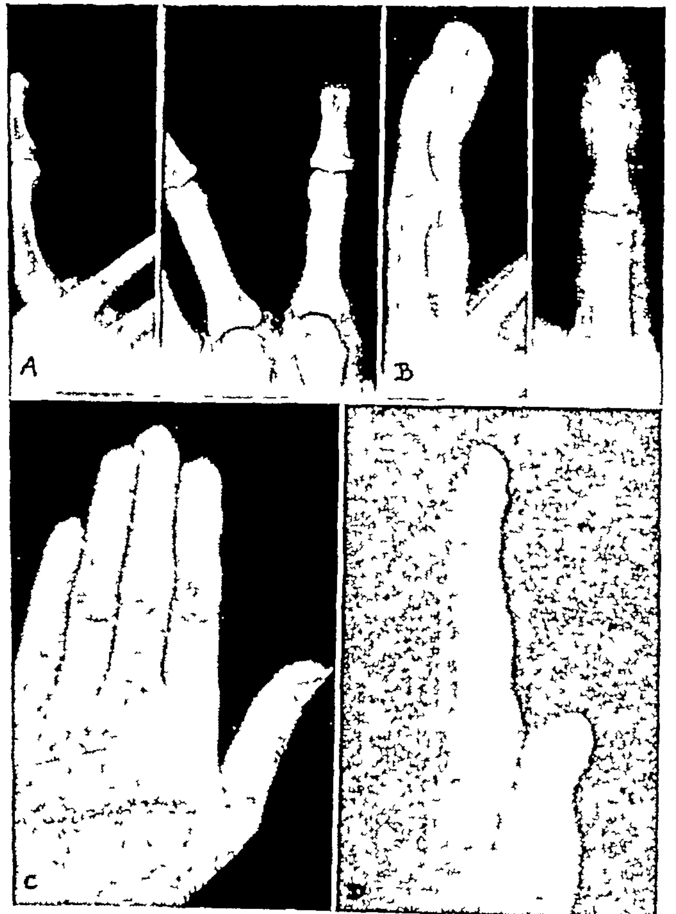


FIG 398 A X-ray of an amputated finger tip B X-ray after transplantation of a toe C and D End result Full sensation on the tip

edge of the bag Thus new skin now totally surrounds the amputated finger The hand and arm are immobilised in plaster for about 3 weeks. *And then the new finger is freed from* the abdomen and shaped.

Three months later tendon-transplantation to the deep flexor—and possibly transplantation for a nail are performed Later the original finger skin is transplanted back from the thigh to the finger

In my experience these fingers normally remain cold for many months and sensation returns slowly in proportion to the length of the finger It will always be somewhat reduced be-

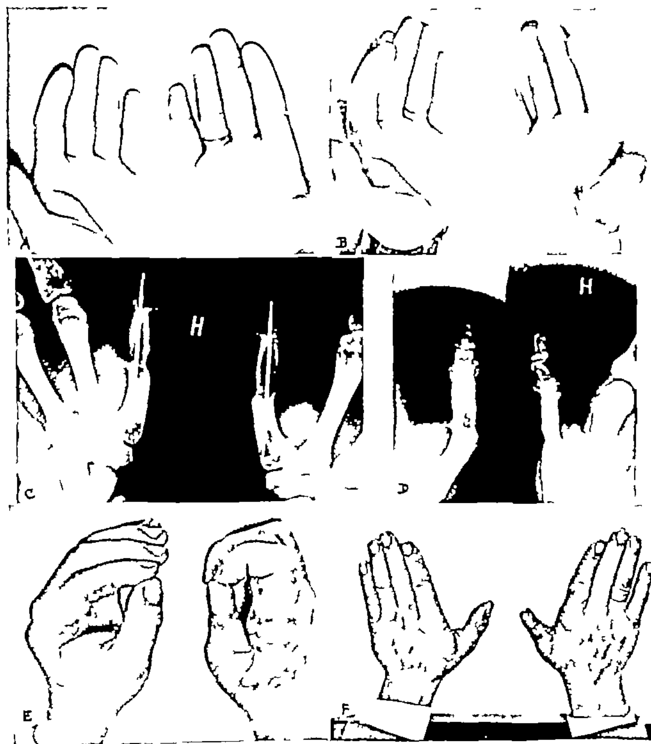


FIG 396 A. An amputated thumb B Thumb during the treatment. C The osteosynthesis. D X-ray of the end results with the second right toe on the tip E. End result. F End result

can be best understood through the analysis of the architectural pathology (Fig 400) The radius forms the main support of the hand When this bony buttress is absent, the muscles of the forearm which are inserted into the various bones of the digits, now exert their pull on the entire unsupported hand The relentless action of the unchecked muscles in time rotates the hand about the ulna in a spiral, and eventually bends the ulna itself into a semicircular arc (Fig 399 and 400)

Eventually the long digital muscles, because of poor leverage and unopposed contraction, are rendered useless as digital movers so that pinch and grasp become very inefficient In addition to absence of radius other associated congenital abnormalities involving the hand may be present Absence of the radial component of the carpal bones, or of the metacarpal or of the phalanges of thumb or of the entire thumb can occur These deformities pose additional difficulties and make reconstruction even more drawn out If the thumb is absent, the only prehensile action which persists is the lateral motion of the fingers made possible by the intrinsic muscles (Fig 399) This pincer action is obviously inadequate, drastically limiting the useful function of the hand *In addition there is little motion at the* wrist which may be fixed in marked degree of pronation about the curved ulna (Fig 399 and 400)

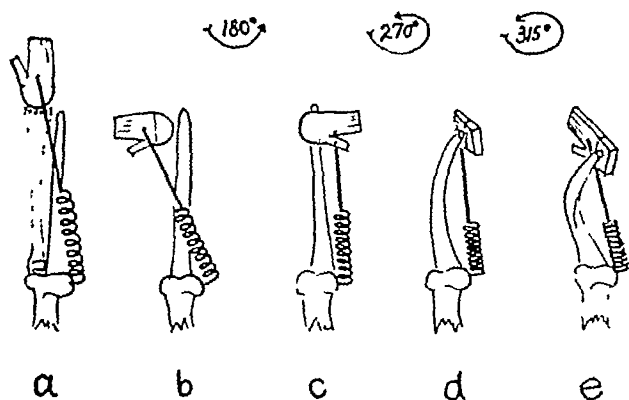


Fig 400 Diagrammatic interpretation of the sequence of architectural changes due to absence of radius occurring in the relation of the hand to the forearm and in the shape of the ulnar bone The spring symbolizes the constant pull of the flexor group of muscles a Normal left hand in anatomical position b In absence of radius which forms the main support of the carpus, the hand is flexed radially for about 90° c The flexor group of muscles pronate the unsupported hand 180° about the ulna as a pivot d Persistent pull of the muscles curves the ulna as well as spirals it in the direction of the pronating force acting on the hand e Utimately the ulna forms a semicircle, the distal end being pronated in relation to the elbow (about 60°) The hand is pronated 315° so that the palm faces almost anteriorly again

The progression of deformity due to absence of radius may range from moderate derangement to an extreme degree of distortion (Fig 400) The usual deformity seen in the infants as they present themselves for treatment corresponds to Fig 400, unless measures are taken to check the extension of the deformity by the pull of the muscles, bowing of the ulna takes place, pronation of the hand and extreme contracture of the muscles follow (Fig 400, d and e) Consequently, every attempt to institute corrective treatment at the earliest possible time and reconstruction of the late complex deformities becomes more difficult and in extreme cases, almost impractical

Old Methods of Treatment

In the 1890's the advocated method of treatment involved an osteotomy of the ulna at midshaft or at the distal end This was followed by some form of attachment of the carpus to the ulna in an attempt to hold the hand in correct alignment [5, 6, 7] Subsequent methods advocated tenotomy of the muscles and a fusion of distal end of the ulna to the carpal bones [8, 10] Antonelli was the first to use a bone graft to replace the radius [2] and Albee [11] wedged the bone graft unto the ulna proximally and into the carpus distally

The conventional method of treatment of recent years entailed holding the hand aligned with the forearm with the aid of casts and rigid splints in order to reduce contraction of the muscles in the forearm and to check the bowing of the ulnar bone At about 3 to 7 years of age fusion of the ulna to the carpal bones was carried out either directly or through a bone graft strut This type of stabilization resulted in rigid wrist and a foreshortened infantile limb

Several obvious disadvantages of the preceding method of management are noted

1 Application of casts does not always correct alignment if the muscle contraction is excessive at the start of the treatment

2 Frequently there is marked contraction of

Dans le cas d amputation de pouce la méthode précédente sera complétée par

1 Une modification de la méthode de Moore de façon à ce que le greffon osseux ne soit pas placé au bout du doigt mais légèrement en avant et en dedans. Plus tard on transfère le second orteil pour obtenir un ongle d une meilleure sensibilité

2 Le pouce amputé est allongé à l aide d un lambeau cutané maintenant le greffon osseux à partir du côté radial de la main. Plus tard le second orteil sera utilisé pour élongation

Über Methoden zum Wiederansetzen Amputierter Finger BJARNE GRUNDT

Der amputierte Finger wird gereinigt die Haut entfernt und am Oberschenkel eingepflanzt um später bei der Neubildung des Fingers verwendet zu werden Der Nagel und ein Teil des Fettes werden geopfert und die Beugesehnen werden zu ihrem distalen Ende verschoben. Blutgefässe Nerven und Streckaehnen werden erhalten Knochenvereinigung stellt die richtige Lage wieder her und wenn möglich werden Sehnen und Nerven vernäht gelegt.

Der Finger wird in einem Bauchlappen eingeschlossen und vernäht Gipsverband wird angelegt Nach drei Wochen wird der Finger befreit und geformt Nach drei Monaten wird die Transplantation der Beugesehnen und der Nägel ausgeführt, dann wird die ursprüngliche Haut von der Hüfte zum Finger zurücktransplantiert Das Gefühl kommt langsam zurück bleibt immer vermindert und die Finger bleiben monatelang kalt.

Methoden für amputierte Daumen werden zusätzlich zu dem Obigen gegeben

1 Moores-Methode wird so modifiziert, dass das Knochentransplantat nicht an der Spitze sondern ein wenig proximal und nach innen zu angesetzt wird. Später wird der zweite Zeh zum Nagelersatz und zur besseren Sensibilität versetzt

2 Der amputierte Daumen wird mittels eines Hautlappens verlängert der das Knochentransplantat von der radialen Seite der Hand hält Später wird der zweite Zeh für die Verlängerung benutzt

---

Reconstruction of Congenital Absence of the Radius.

MARTIN A ENTIN M D AND J G PETRIE M D *Royal Victoria Hospital and Shriners Hospital Montreal, Canada*

Congenital absence of the radius poses several difficult problems to the reconstructive surgeon and constant vigilance and prolonged follow up are required before lasting useful function can be attained. The present report is based upon the study of the various older methods of treatment to this condition as well as of newer ones the principles of management which evolved from this study have been adapted for the treatment of our patients.

Petit[1] is thought to be the first author to describe a bilateral total absence of the radius in 1733 but active interest in the reconstruction of this congenital deformity did not begin until the 1890 s Antonelli collected 114 cases from the literature in 1904[2] Twenty years later Kato reviewed the world publications and was able to extract 250 cases to which he added 3 cases of his own.[3] In almost half of these cases the deformity was bilateral (46 per cent) The associated malformations of carpals and metacarpals were meticulously analyzed by O Rahilly[4] from the reported cases of radial hemimelia. Although numerous anomalies have been found in association with congenital absence of radius[3,4] the relationship is not constant and indeed, the etiology of this malformation is not known

The extent of the deformity due to absence of radius in untreated case depends upon the associated abnormalities of the carpus metacarpals and of the muscles of the forearm At birth, the hand is usually in about 90 of flexion so that it appears to be perpendicular to the axis of the forearm Moreover there is about 180 of pronation. With growth of the limb further alteration takes place in the relation of the hand to the forearm due to the constant pull of the muscles in the unsupported hand (Fig 399 a and b) In a severe case the ultimate distortion



FIG 399 Typical severe deformity due to congenital absence of radius in a four year-old boy a The hand is pronated about the bent ulna and extension is limited. b X-ray of the hand and forearm shown in a.

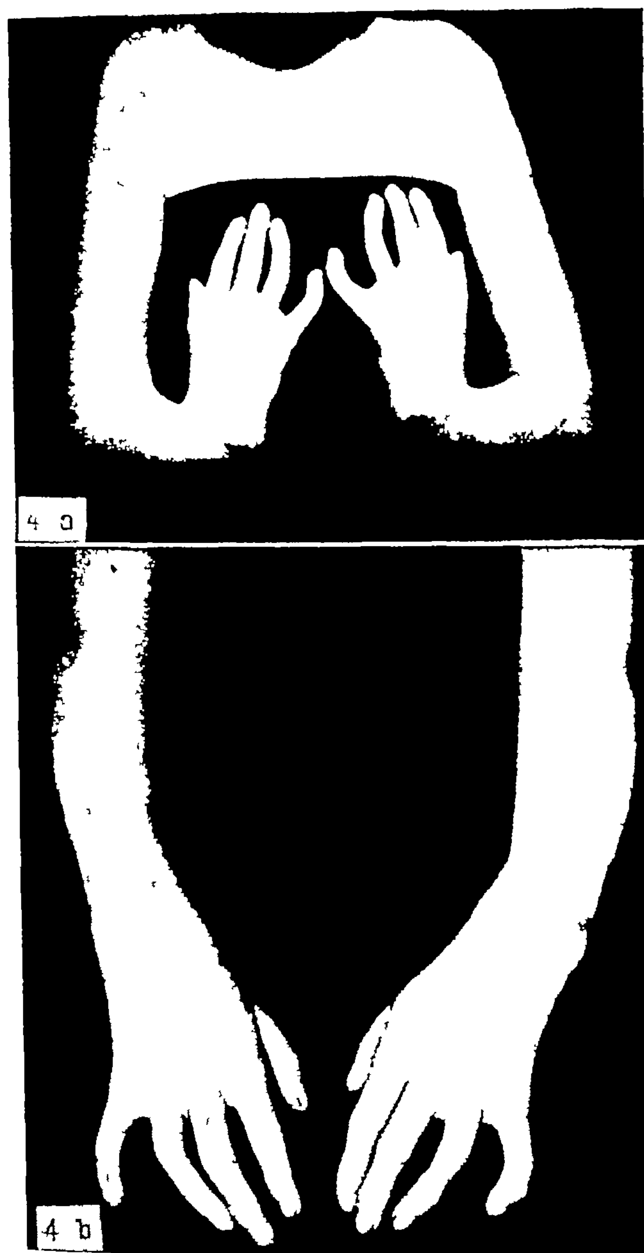


Fig 402 Reconstruction of bilateral congenital absence of radius with the aid of bone graft using the proximal half of autogenous fibula a Appearance of the hands of seven-year-old girl before bonegrafting b Correction of alignment of the hands with bone grafts Right hand—one year after bone graft Left hand—two years after bone graft

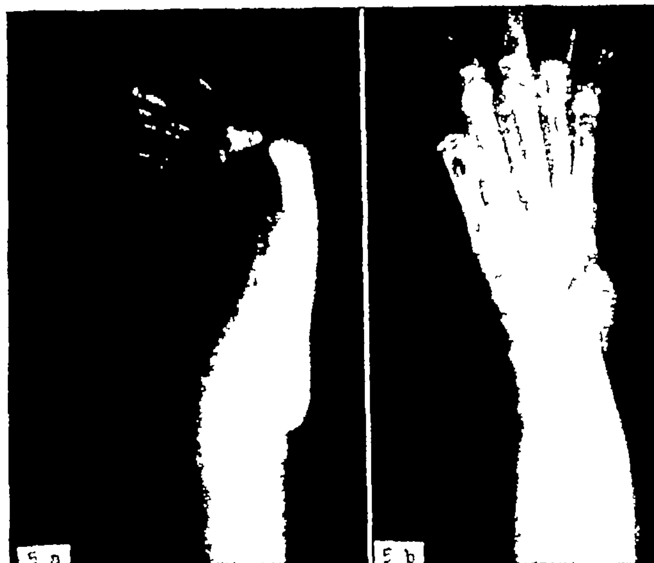


Fig 403 Reconstruction of congenital absence of the radius with autogenous fibular bone graft a Preoperative X-ray of the right hand shown in fig 402a b X-ray of the same forearm taken one year after autogenous fibular bone graft

the stabilization with fibular bone graft alone, though it improves both alignment and function of the hand, does not constitute termination at reconstruction Absence of the thumb, for example, requires provision of a substitute member in order to attain efficient grasp and pinch Several procedures are available and are beyond the scope of this paper

The improvement of the function of the hand following stabilization is gradual but is progressive In patients who have an absent radius but in whom the hand is anatomically intact, the function which followed reconstruction very nearly approached normal within two or three years after the stabilization with bone graft

Summary

Reconstruction of congenital absence of radius poses a difficult problem and requires prolonged follow-up before useful function can be attained The conventional methods of treatment advocated by various authors involved maintaining the alignment of the hand with the aids of casts and rigid splints Subsequent bony stabilization by fusion of the ulna to the carpo-metacarpal structures produced a foreshortened limb

Based upon the evaluation of the various available methods carried out in this study, the following principles of management were evolved and are followed in the treatment of this deformity

Correction of soft tissue deformity is carried out as early as possible in order to attain satisfactory alignment of the hand Light elastic splints are used to permit greatest use of the hand and to maintain alignment

Autogenous bone graft from the proximal half of the fibula is used to replace the absent radius Fusion of bony structures is not carried out, so that growth of the limb is not impaired The corrected alignment of the limb usually produces

the skin which restricts the straightening of the hand.

3 Cumbersome rigid splints interfere with growth and restrict function Since the casts or splints have to be worn for some years frequent changes and constant supervision is required.

4. If bony fusion is carried out too early the growth is interfered with resulting in a foreshortened limb

Proposed Method of Management

The analysis of the dynamic forces responsible for the development of the deformity due to the congenital absence of radius brings out the multiplicity and complexity of the reconstructive procedures required The sequence of changes which if uncontrolled, produce shortening and contraction of the forearm muscles, malposition of the hand curving and spiraling of the ulna, foreshortened limb fibrosed muscle and inefficient grasp demand institution of earliest treatment. In order to obtain maximum function in the hand and satisfactory appearance of the forearm the following principles of management were adopted for the treatment of our patients

1 Treatment is started as early as possible by applying light elastic splints to maintain the hand in correct alignment with the forearm. The splints permit normal use of the hand but should be adjusted frequently to allow unrestricted growth.

2. If the hand cannot be placed in correct alignment when the child is seen for the first time, correction of soft tissue deformity by lengthening of the muscles and z plasty of skin are carried out.

3 Elastic splints are maintained for a minimum of 12 hours a day until 6 to 8 years of age (Fig 401)

4. Soft tissue release and muscle lengthening may be required at 6 to 8 years skeletal traction is applied through Kirschner wire in the metacarpal bones until the carpal bones become advanced just distal to the ulnar styloid.

5 Autogenous bone graft from proximal half of the fibula preserving the head and the epiphyseal plate is wedged into the ulna. The fibular head forms a buttress for the carpus. The arm is maintained in a cast for about 16 to 20 weeks (Fig 402 and 403)



Fig 401 Maintenance of alignment of the hand with light elastic splints. a X ray of the right arm of one-year-old boy showing deformity due to absence of the radius b The light steel wire splint maintains the hand in correct alignment.

6 No bony fusion is carried out at the wrist so that growth of ulna and carpus are not impaired. The alignment for the hand is maintained and improved function of fingers results (Fig 402)

7 Osteotomy of the ulna may be carried out later if bowing persists or if further deviation of the hand takes place.

The initial steps in the management outlined above are designed to curtail the action of the deforming forces from the earliest moment while encouraging the greatest use of the hand until stabilization becomes practical. It is desirable to preserve the growth centers of the ulna since it is greatly shortened by the deformity Skeletal traction at the later stage of reconstruction is very important because it helps to attain better alignment of the hand and also provides adequate space for the insertion of the bone graft.

The fibular head is particularly suitable for supporting the carpus and forms a "natural" substitute for the absent radius. The preservation of the epiphyseal plate in the graft as recommended by Starr [12] adds another incentive for the choice of the fibula Although the epiphyseal plate remains radiologically patent for as long as one year the evidence available from the several fibular grafts used in our cases is not convincing regarding the continuation of the growth of the transplanted bone.

If in addition to absence of radius other congenital abnormalities are present in the hand,

XII

CLINICAL AND EXPERIMENTAL RESEARCH

A. Skin

Report on Our Study of Skin Thickness on the Entire Surface of Face and Body. MARIO GONZÁLEZ-ULLOA, M D , EDWARDO STEVENS, M D , GABRIEL ALVAREZ FUERTES, M D AND FÉLIX LEONELLI, *Dalinde Hospital, Mexico City, Mexico*

To date, no systematic study of the thickness and histological characteristics of the cutaneous cover of man appears to have been made

In a bibliographic investigation, we found only partial isolated studies[1, 2, 4, 8, 9, 10, 14, 15, 16, 18, 19, 20, 21, 22] of the thickness and the histology, and these were limited to particular regions of the skin or alterations in certain diseases

In 1954,[23] we carried out a review of the thickness and histological structure of the skin of the face, but without going so far as to elaborate a *map of the entire skin*, this is what we carry out in the present study, with a view to having at hand the necessary elements to select the adequate skin for a specific regional restoration

I Planning

To begin with the cutaneous surface was divided into specific regions, according to its external characteristics, the folds and differences in the relief of the skin (Fig 404)

Each region was investigated from two points of view A (left) Thickness of the epithelial layers, B (right) Histological structure

Our aim was to study these characteristics in the new-born, the adolescent, the adult and the senescent

We thought it also of interest to search for any differences between man and woman

To determine whether one particular region shows variation of thickness and histological composition, the cheek, mammary, thigh, and foot regions were studied in several places

In order to find an histological pattern, the characteristics observed in the different skin specimens were correlated numerically

For the study of the different depths of the epithelial elements, several cuts were made parallel to the surface of the skin

For comparisons of the observations in all the regions, the skin fragments were taken in a direction parallel to the Langer lines The histological cuts were taken at right angles to them

To discover whether the direction of the cut



FIG 404

improved function of the hand Subsequent arthrodeses may be carried out if necessary when full growth has been attained

Specific cases are presented to illustrate the nature of the deformity the procedure used in reconstruction and the final results attained

Royal Victoria Hospital
Montreal Quebec Canada

References

1 Petit, J L. Mem. de L acad roy de Sci Paris, p 17 1733
2 Antonelli I Ztschr f orthop Chir., 14 214 1904
3 Kato K. Congenital absence of the radius J Bone J Surg., 6 589 1924
4 O'Rahilly R Morphological patterns in limb deficiencies and duplication Amer J Anat omy 89 135 1951
5 Hoffa, A Zur Statistik der Deformitaten Munch med Wchnschr., 37 237 1890
6. Romano C Grave Mano torta Congenita Arch di ortop 11 80 1894
7 McCurdy S L Congenital absence of radii with operation. Tr Am Orthop Assoc 8 8 1895
8 Sayre R. H A contribution to the study of club-hand Tr Am Orthop Assoc., 4 208 1893
9 Stiendler A. Orthopedic operations. P 199 Springfield Ill C C Thomas 1940
10 Bardenheuer B Bericht uber d. Verhandl d deutsche Gesellschaft f Chir Leipzig 23 Kogr p 106 1894
11 Albee, F H Formation of radius congenitally absent Ann Surg., 87 105 1925
12 Starr D E. Congenital absence of the radius J Bone J Surg., 27 572, 1945

Réconstruction dans le Cas d Absence Congenitale du Radius. Martin A Entin

La reconstruction dans l absence congénitale du radius cause un problème difficile et requiert une vigilance continuelle pour obtenir une fonction adequate Les méthodes conventionnelles du traitement exigent la fusion prématurée des os du carpe au bout distal du cubitus avec comme résultat un délai inévitable de croissance exprimé par un raccourcissement du membre

Afin d obtenir une meilleure fonction de la main et d améliorer les résultats esthetiques, voici les principes que nous avons employés dans le traitement de nos patients La correction des malformations des tissus mous par Z plastie de la peau et allongement musculaire est pratiquée relativement tôt. Ces techniques permettent un alignement satisfaisant de la main qui est ensuite maintenu par une traction élastique légère qui n interfère pas avec la croissance ou la fonction du membre

Vers l'âge de 8 ou 12 ans, une greffe osseuse autogène prélevée à la moitié supérieure du péroné est employée pour remplacer le radius absent. Aucune fusion est pratiquée La croissance peut alors continuer et amener un alignement tissulaire et une fonction améliorée

Herstellung des Radius bei Angeborenem Defekt Martin A Entin

Die Herstellung eines von Geburt fehlenden Radius stellt ein schwieriges Problem dar und erfordert eine lange Nachbehandlung und ständige Wachsamkeit bis eine brauchbare Funktion erzielt werden kann Die gebrauchliche Behandlungsmethode bestand in der frühzeitigen Vereinigung der Mittelhand mit dem distalen Ende der Ulna und führte unweigerlich zu Wachstumsverzögerung und Verkürzung des Gliedes

Um eine bessere Funktion der Hand und ein befriedigendes Aussehen zu erhalten wurden die folgenden Grundsatze bei der Behandlung unserer Patienten in Anwendung gebracht Korrektur der Weichteildeformität mit Verlangerung der Muskeln und Z-Plastik der Haut wurden ziemlich früh ausgeführt Dieses Vorgehen gestattet befriedigende Einrichtung der Hand die mittels einer leichten elastischen Schiene fixiert wird wodurch das Wachstum unbeeinträchtigt bleibt.

Im Alter von etwa 8 bis 12 Jahren wurde ein autogenes Knochentransplantat von der proximalen Hälfte der Fibula genommen um den fehlenden Radius zu ersetzen

Es wurde keine Fusion vorgenommen, so daß das Wachstum nicht behindert wurde während die Stellung der Hand beibehalten und Funktionsverbesserung erzielt wurde

Reconstruccion de la Ausencia Congenita del Radio Martin A Entin

La reconstrucción de la ausencia congénita del radio representa un problema difícil y requiere vigilancia prolongada y continua antes de alcanzar una función util. Los métodos convencionales del tratamiento incluyen fusión temprana del carpo a la porción distal del cubito lo que inevitablemente trae como consecuencia un retraso del crecimiento y un acortamiento del miembro

Con el objeto de lograr una mejor función de la mano así como una apariencia satisfactoria, fueron adaptados los siguientes principios en el manejo del tratamiento de nuestras pacientes Corrección de la deformidad de los tejidos blandos con estiramiento de los musculos y Z-plastía de piel lo más temprano posible Esto procedimiento permitió un alineamiento satisfactorio de la mano mantenido por una férula ligera y elástica que no debe interferir con el crecimiento o el uso de la mano

Para reemplazar el radio debe ser usado un injerto óseo autógeno de la mitad proximal del peroné de un individuo de ocho a doce años de edad No se obtiene ninguna fusión ni se logra crecimiento mientras el alineamiento es mantenido y no se ha comprobado haber alcanzado cierta función

XII

CLINICAL AND EXPERIMENTAL RESEARCH

A. Skin

Report on Our Study of Skin Thickness on the Entire Surface of Face and Body. MARIO GONZÁLEZ-ULLOA, M D, EDWARDO STEVENS, M D, GABRIEL ALVAREZ FUERTES, M D AND FÉLIX LEONELLI, *Dalinde Hospital, Mexico City, Mexico*

To date, no systematic study of the thickness and histological characteristics of the cutaneous cover of man appears to have been made

In a bibliographic investigation, we found only partial isolated studies[1, 2, 4, 8, 9, 10, 14, 15, 16, 18, 19, 20, 21, 22] of the thickness and the histology, and these were limited to particular regions of the skin or alterations in certain diseases

In 1954,[23] we carried out a review of the thickness and histological structure of the skin of the face, but without going so far as to elaborate a *map of the entire skin*, this is what we carry out in the present study, with a view to having at hand the necessary elements to select the adequate skin for a specific regional restoration

I Planning

To begin with the cutaneous surface was divided into specific regions, according to its external characteristics, the folds and differences in the relief of the skin (Fig 404)

Each region was investigated from two points of view A (left) Thickness of the epithelial layers, B (right) Histological structure

Our aim was to study these characteristics in the new-born, the adolescent, the adult and the senescent

We thought it also of interest to search for any differences between man and woman

To determine whether one particular region shows variation of thickness and histological composition, the cheek, mammary, thigh, and foot regions were studied in several places

In order to find an histological pattern, the characteristics observed in the different skin specimens were correlated numerically

For the study of the different depths of the epithelial elements, several cuts were made parallel to the surface of the skin

For comparisons of the observations in all the regions, the skin fragments were taken in a direction parallel to the Langer lines The histological cuts were taken at right angles to them

To discover whether the direction of the cut



FIG 404

had any influence on the measurements some skin specimens taken in a direction perpendicular to the Langer lines were studied

II Procedure

To obtain representative measurements only fresh corpses were chosen, not showing alterations of the skin and of normal weight

It was possible to study only four of the five corpses selected for investigation. Medico-legal difficulties have prevented our obtaining the body of an adolescent up to the present time.

The following four bodies were studied (Table A)

On each body forty basic regions were marked out these were numbered from one to forty and marked by a code formed by first the letter indicating the corpse followed by the number corresponding to the region (Fig 405 top)

Twenty-eight of the forty regions into which the entire cutaneous surface was divided were on the trunk and the other twelve on the head (Fig 405 bottom)

In the center of each region an ellipse was resected with its longer axis parallel to the Langer lines, of two cms in length and 0.8 in width The skin was sectioned perpendicularly down to the subcutaneous tissues (Fig 406)

The donor region of the skin was sutured with individual stitches of cotton thread.

Each specimen was attached with four plastic needles to a card carrying the designation of the corpse and the number of the region.

These cards were then rolled up with the skin segment on the outside tied with cotton thread and placed in glass flasks containing a 10 per cent formol solution for a period of not less than fourteen days, so as to avoid hardening and the phenomena of retraction which were observed in the first experiments

The cutaneous fragments were then removed

CADAVER	CHARACTERISTICS	AGE	CAUSE OF DEATH.
A	FEMALE (Adult).	23	[illegible]
B	MALE (Adult).	[illegible]	INTOXICATION.
C	SENESCENT	70	PULMONAR T B.
D	NEW BORN	—	BRONCHOPNEUMONIA.

Table A

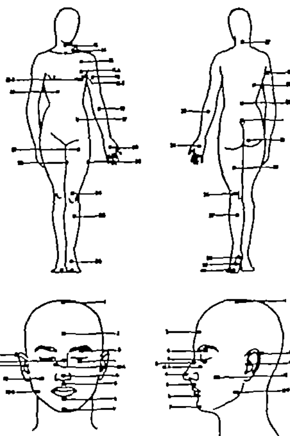


Fig. 405

and from each a square of skin with its sides perpendicular to the cutaneous surface was cut

To avoid retractions and tissue alterations in the skin studied, it was embedded in paraffin, according to the usual routine technique employed in histological and pathological laboratories. The cut paraffin sections were stained with hematoxylin-eosin by a standard method and mounted on slides for microscopic examination.

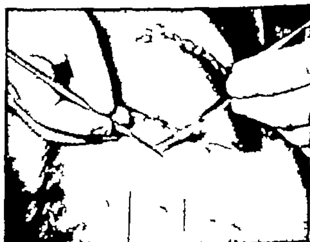


Fig. 406

The microscopic examination of the skin fragments had the following two aims

1 To measure the thickness of the epidermis and the dermis

2 To study histologically (a) the horny layer, (b) the epidermis, (c) the dermis, (d) the hypodermis

The measurements were carried out with a "Zeiss" microscope with 2× oculars and 10×, 20× and 40× field lenses, using an ocular micrometer (Fig 407, top left)

The magnification of the optical system was checked for each objective with a Neubauer Biometric camera (Fig 407, lower left).

With the 10× objective a magnification of 20 9 microns for each small division was attained

With the 20× objective, 9 9 microns per division

With the 40× objective, 4 16 microns per division

The epidermis was measured from the granular layer to the basal layer (Fig 407, top right) Because of the frequency with which the horny layer was found disintegrated it was eliminated from routine measurements

The dermis was measured from the basal layer to the deep tracts of the connective tissue (Fig 407, lower right), where glandular structures disappear and adipose cells begin to show

In some regions where the thickness of the horny layer appeared interesting, it was separately measured

Because of the small thickness of the epidermis, this was measured with the magnification of eighty diameters

The dermis was measured with a magnification of twenty or forty diameters

Each layer was measured in five places along the length of the cutaneous cuts (Fig 408), the attempt was made always to measure a representative thickness and the results were averaged arithmetically

For the examination of the histological structure, the same optical system was used, and the data on each subject collected in a table with the name of the cadavers and the regions in the rows and the characteristics to be studied in the columns

The following data were studied. (Table B)

In the Epidermis

1 Thickness
2 Cornification
3 Stratum spinosum
4 Pigmentation
5 Surface regularity
6 Pathological disturbances

In the Dermis

7 Thickness
8 Papillae
9 Connective tissue
10 Cell presence
11 Muscular tissue
12 Nerve elements
13 Sweat glands

INVESTIGATION ON SKIN THICKNESS

EPIDERMIS	DERMIS	HYPODERMIS
1 - Thickness	7 - Thickness	20 - Adipose tissue
2 - Cornification	8 - Papillae	21 - Muscular tissue
3 - Stratum spinosum	9 - Connective tissue	22 - Vascularization
4 - Pigment	10 - Cell presence	23 - Nervous elements
5 - Surface regularity	11 - Muscular elements	24 - Hair follicles.
6 - Pathologic disturbances	12 - Nervous elements	25 - Sebaceous glands
	13 - Sweat glands	26 - Sweat glands
	14 - Sebaceous glands	
	15 - Hair follicles	
	16 - Pigment	
	17 - Vascularization	
	18 - Deepness of epithelial elements (hair follicle, sweat and sebaceous - glands)	
	19 - Pathologic disturbances	

Table B

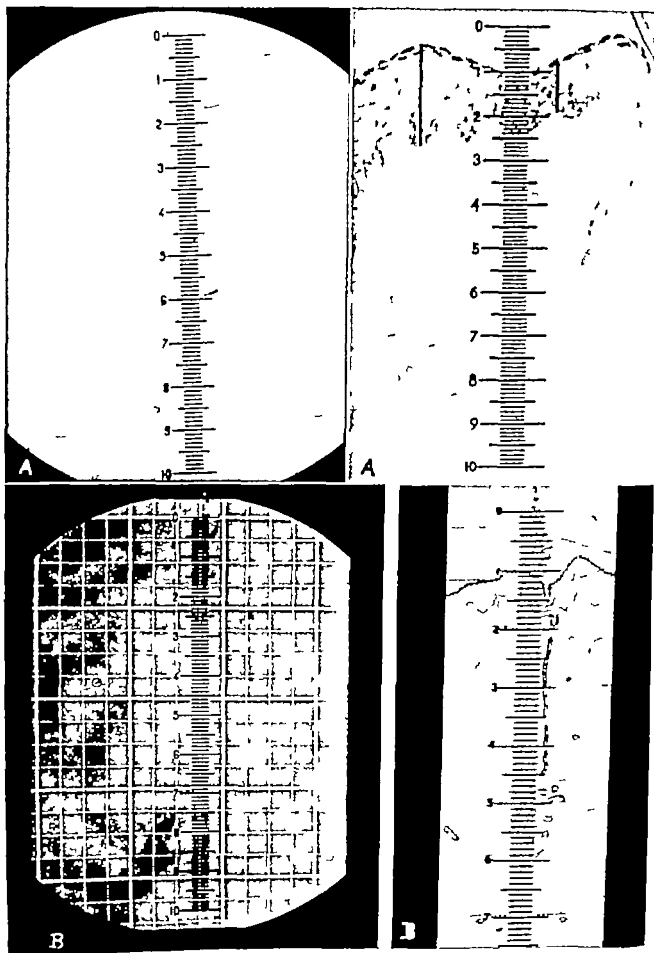


Fig 407

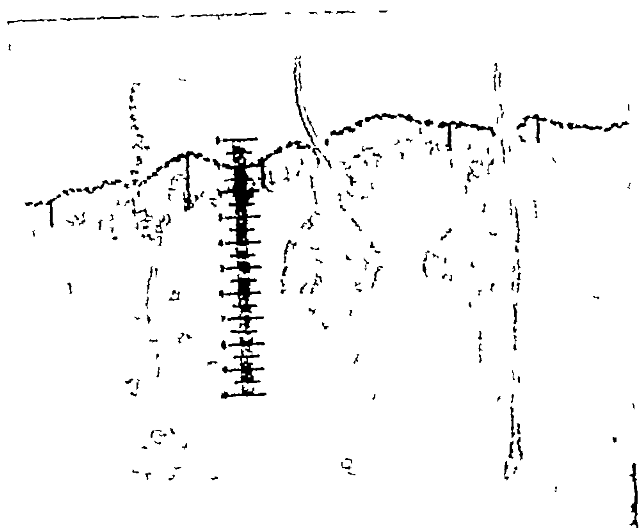


FIG 408

14 Sebaceous glands
15 Hair follicles
16 Pigmentation
17 Vascularization
18 Depths at which the epithelial elements (hair follicles, sweat and sebaceous glands) are found
19 Pathological disturbances

IN THE HYPODERMIS

20 Adipose tissue
21 Muscular tissue
22 Vascularization
23 Nerve elements
24 Hair follicles
25 Sebaceous glands
26 Sweat glands

The number of elements found was noted in the following way

X—Few elements
XX—Average number
XXX—Abundant
XXXX—Very abundant

Employing such a tabulation of the data had the advantage of presenting at one glance the results on each subject and of the four subjects

III PHOTOGRAPHY

The photomicrography of the cutaneous sections was done with a "Leica" camera, using the microphotographic attachment "Mikas" adapted to a "Zeiss" microscope with 2× ocular and 10×, 20×, and 40× objectives

In order to be able to measure the various cutaneous strata in the photomicrographs, the ocular micrometer was included in the optical train

The front lens of the micrometer ocular was moved until the scale was focused on the focal plane of the camera in order to obtain a sharp image (Fig 409, top)

We used Ansco-Color film for artificial light, type B This film was chosen for the following reasons

a The colours obtained with this film appear to correspond better to the stains used

b The film can be developed immediately and the photographs observed and if necessary repeated

The light source was placed seven inches from the microscope mirror with the condenser at ⅞ of its total course

For the magnification of eighty diameters, each photograph was exposed ¼ of a second

For forty diameters, ⅛ of a second

For twenty diameters, 1/20 of a second (with the condenser ¾ of the way up)

In some cases the exposure was different in order to compensate for the thickness of the preparation

The greater number of the photographs were taken with the magnification of eighty diameters Only in certain regions (A-20, A-38, C-38, B-39, C-39, D-39, A-40 and C-40) were they taken at forty diameters, and in B-38 and B-40 at twenty diameters This change of magnifications was effected so as to include in the photograph the horny and epidermal layers, which in some cases were very thick

Once the photomicrographs were obtained, all those corresponding to one and the same region were mounted on lantern slides (8 3 x 10 8 cm) in the following order

Upper left	Subject A
Upper right	Subject B
Lower left	Subject C
Lower right	Subject D

In this way the differences due to sex and age in each of the regions studied could be seen in a single plate (Fig 409, bottom)

For identification purposes the upper part of each plate carries the name of the region in Spanish, English and French

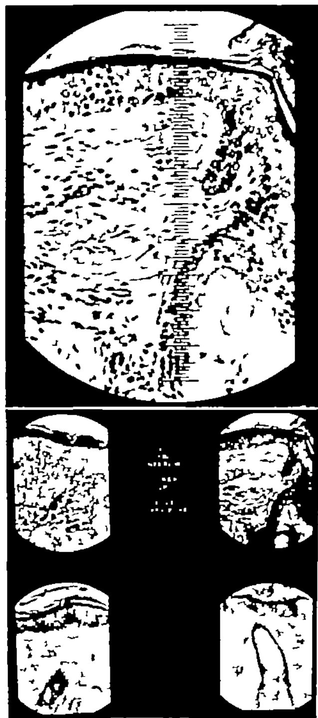


FIG. 409

IV OBSERVATIONS

The first thing to be noted is the marked irregularity in thickness of the cutaneous cover (Table C) and the great difference in thickness between the epidermis and the dermis.

In accordance with the thickness variations of the dermis, the uniformity in thickness of the epidermis over the entire cutaneous surface is notable, the measurements showed that the male (adult) epidermis averages sixty microns, the senescent fifty-one microns that of the newborn thirty-six microns and that of the female subject thirty three microns (Table D)

In the thickness graph some regions (heel and sole of foot) showed a sudden rise in thickness. These regions were considered as discordant elements and not taken into account in calculating the mean thickness of the epidermis.

It is to be noted that the newborn did not show this extreme variation in the epidermal thickness.

It is interesting to note that the mean of the ratios of thickest to thinnest epidermis in the four subjects was 6 to 1, that eliminating the discordant elements mentioned above, the ratio is 2.5 to 1 and that between the thinnest and the mean epidermis of the four subjects the relation is 1 to 2

The comparison of the epidermal thickness of the subjects studied showed that individual differences were not remarkable varying from seventy to forty microns for the male (Adult) from sixty to thirty for the female and from fifty to twenty for the senescent and the newborn. The general mean thickness of the epidermis for the whole series studied was forty eight microns, which is within the limits given for all four subjects.

The *horny layer* shows very marked thickening in some regions which in most of the subjects were the same (foot and hand)

The horny layer of the heel was 1,640 microns thick in the man and 1,310 microns in the woman

The woman s hands also showed notable cornification. The *stratum spinosum* of the adult male was found to be five cells high on an aver age that of the woman four that of the senescent three and that of the child four cells high.

In general the epidermis is very thin, almost invisible to the naked eye. It is from 10 to 60 times thinner than the dermis which determines the effective thickness of the skin (Fig 410)

The *dermis* is the mechanically resistant layer by its thickness and by its abundance of con nective tissue gives strength to the cutaneous cover

Under the microscope became evident the great number of collagen fibres crossing the dermis in all directions also the richness of the

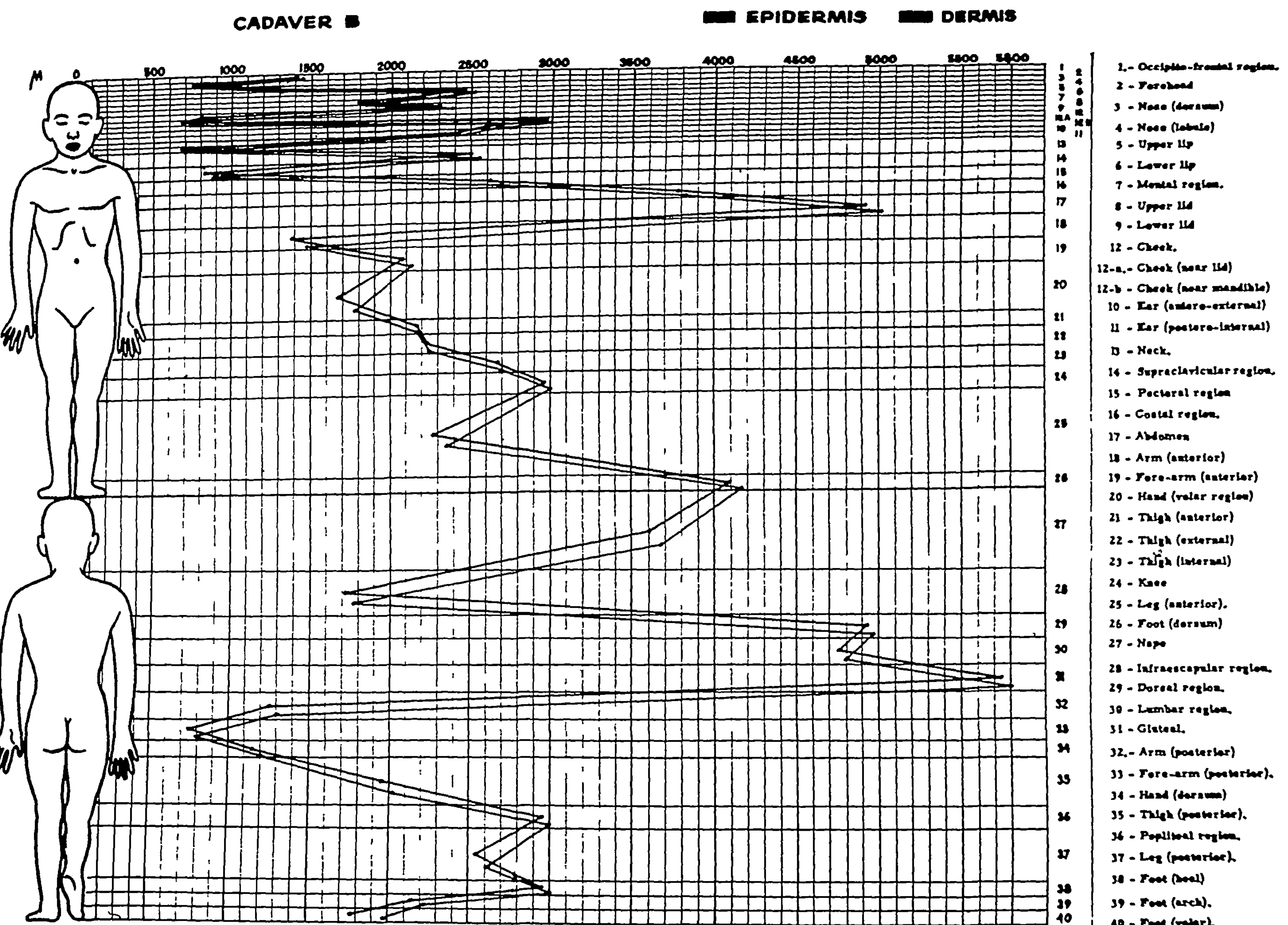


TABLE C Regional variations in skin thickness (epidermis—dermis)

AVERAGE OF SKIN THICKNESS
A DIFFERENT AGES SEXES

SUBJECT	EPIDERMIS	DERMIS	TOTAL THICKNESS
MALE (Adult)	[illegible]	[illegible]	[illegible]
FEMALE (Adult)	[illegible]	[illegible]	[illegible]
SENESCENT	[illegible]	[illegible]	1,879
NEW BORN	[illegible]	[illegible]	[illegible]
AVERAGE	[illegible]	[illegible]	[illegible]

TABLE D

epithelial elements in the sweat and sebaceous glands their excretory ducts and in the hair follicles.

The thickness of the dermis is extremely variable values from 660 to 6,940 microns being encountered in the same subject. The general mean for all the regions studied in the three adult cases was found to be 1,538 microns

In the woman (Table E) the maximum thickness was 6,940 microns and the minimum 680 microns with a general average of 2,005 microns

In the male (Table F) the thickness of the dermis is greater than in the other subjects studied, it ranges from a minimum of 700 to a maximum of 5,800 microns the mean being of 2,324 microns

In the senescent (Table G) the maximum thickness of the dermis was 3 760 microns and the minimum 700 microns with a total mean of 1,824 microns

In the newborn (Table H) the maximum value reached was 1 700 microns and the minimum 160 microns the mean thickness being 855 microns

In the four cases the type of skin nearest to their respective mean thicknesses was

The abdomen for the woman.

The anterior aspect of the thigh for the man

The pectoral region for the senescent.

The neck for the newborn.

The thickest dermis found in our study was that of the dorsal region in the woman while the thinnest belonged to the lower lid of the newborn (Table I)

The mean ratio of the thickest to the thinnest dermis in the same subject was 11 to 1 eliminating the discordant elements, as above, the ratio becomes 5 to 1 and that of the mean value to the thinnest dermis in each case is 3 to 1

The extreme variations of dermal thickness 11 to 1 is due mainly to the fact that a few regions are very thick in relation to the mean dermis.

The greatest mean value of dermal thickness is found in the male case 2,324 microns) then follows the woman (2 005 microns) the senescent (1,824 microns) and finally the newborn (825 microns)

Histologically the dermis border on the epidermis at the papillary level The papillae are generally of average size sometimes very small (lower eyelid and anterior external ear) and occasionally large and of very variable height (foot and hand) Frequently they impose their shape on the external surface of the skin. The abundance of vascular elements belonging to

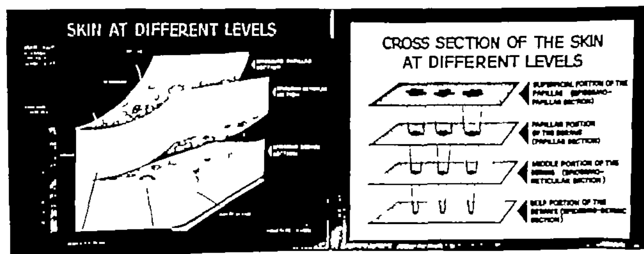


FIG. 410

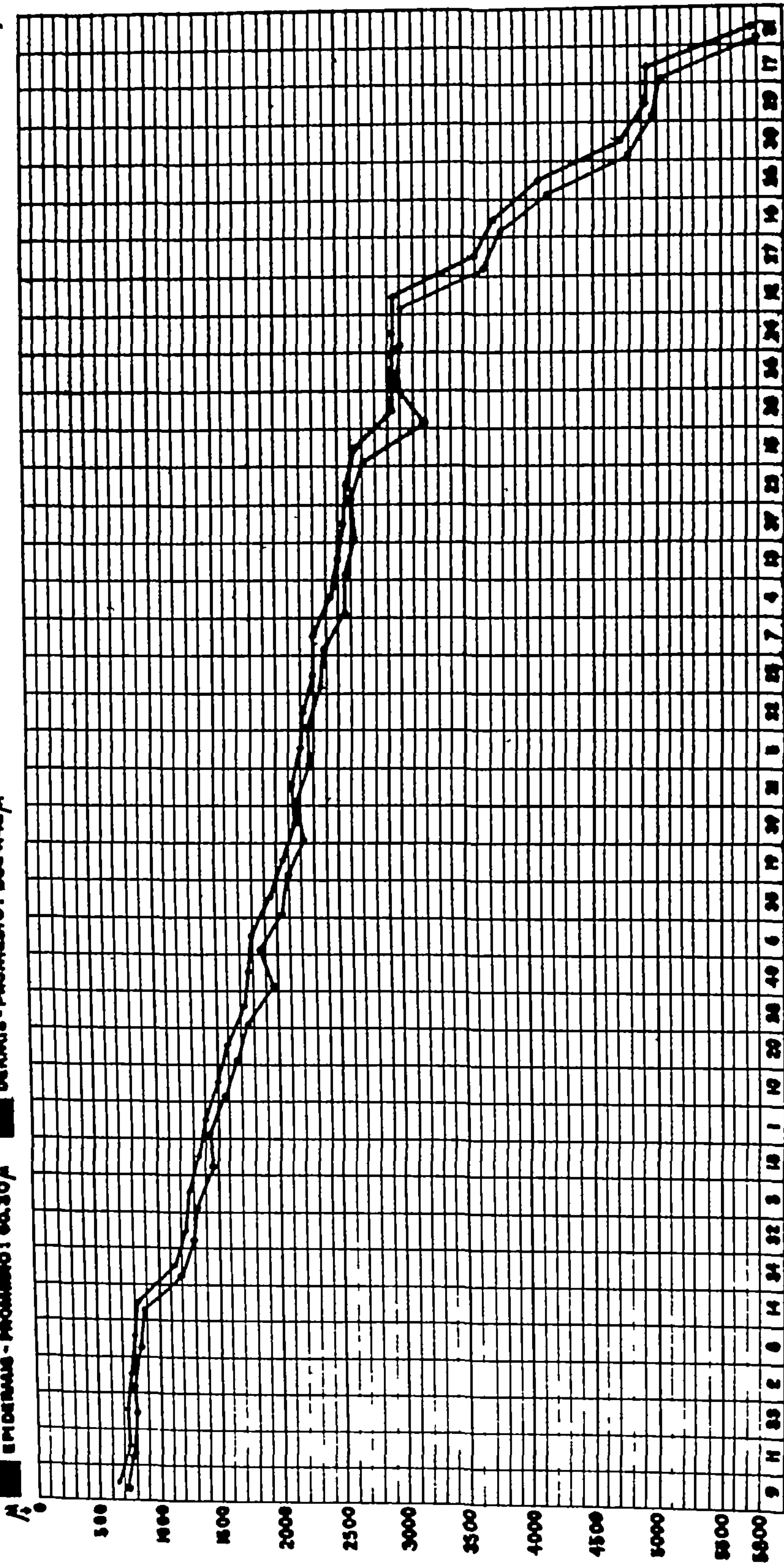

CADAVER B
SKIN THICKNESS IN MALE (Adult)—(Epidermis-Dermis)
EPIDERMIS - PROMEDIO: 60.30 μ
DERMIS - PROMEDIO: 2324.42 μ
Gluteal.
Abdomen.
Dorsal region.
Lumbar region.
Foot (dorsum).
Costal region.
Nape.
Cheek.
Knee.
Popliteal region.
Foot (heel).
Pectoral region.
Thigh (internal).
Leg (posterior).
Neck.
Nose (lobule).
Mental region.
Leg (anterior).
Thigh (external).
Upper lip.
Thigh (anterior).
Pié (arco).
Fore-arm (anterior).
Thigh (posterior).
Lower lip.
Foot (volar).
Infraescapular region.
Hand (volar region).
Ear (antero-external).
Occipito-frontal region.
Arm (anterior).
Nose (dorsum).
Arm (posterior).
Hand (dorsum).
Supraclavicular region.
Upper lid.
Forehead.
Fore-arm (posterior).
Ear (postero-internal).
Lower lid.
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000

TABLE E

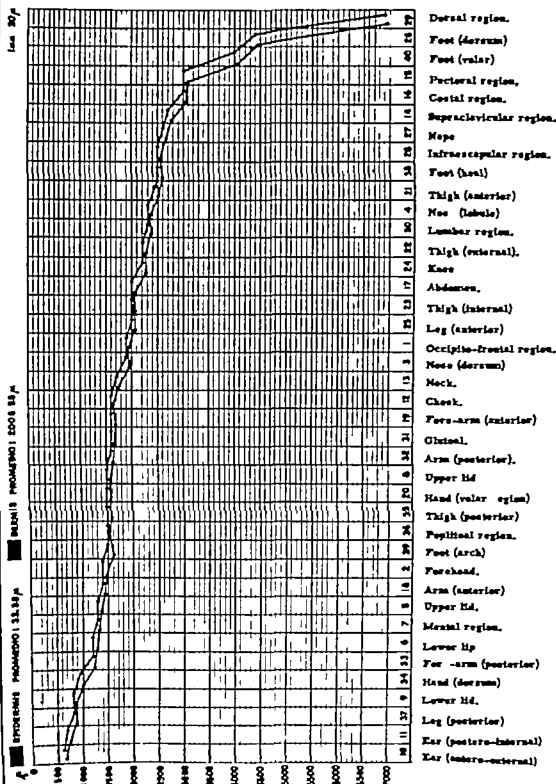

CADAVER A
SKIN THICKNESS IN FEMALE (Adult)—(Epidermis-Dermis)
Dorsal region.
Foot (dorsum)
Foot (volar)
Pectoral region.
Costal region.
Supraclavicular region.
Nape
Infrascapular region.
Foot (heel)
Thigh (anterior)
Nose (lobule)
Lumbar region.
Thigh (external).
Knee
Abdomen.
Thigh (internal)
Leg (anterior)
Occipito-frontal region.
Nose (dorsum)
Neck.
Cheek.
Fore-arm (anterior)
Gluteal.
Arm (posterior).
Upper lid
Hand (volar region)
Thigh (posterior)
Popliteal region.
Foot (arch)
Forehead.
Arm (anterior)
Upper lid.
Mental region.
Lower lip
Fore-arm (posterior)
Hand (dorsum)
Lower lid.
Leg (posterior)
Ear (postero-internal)
Ear (antero-external)

TABLE F

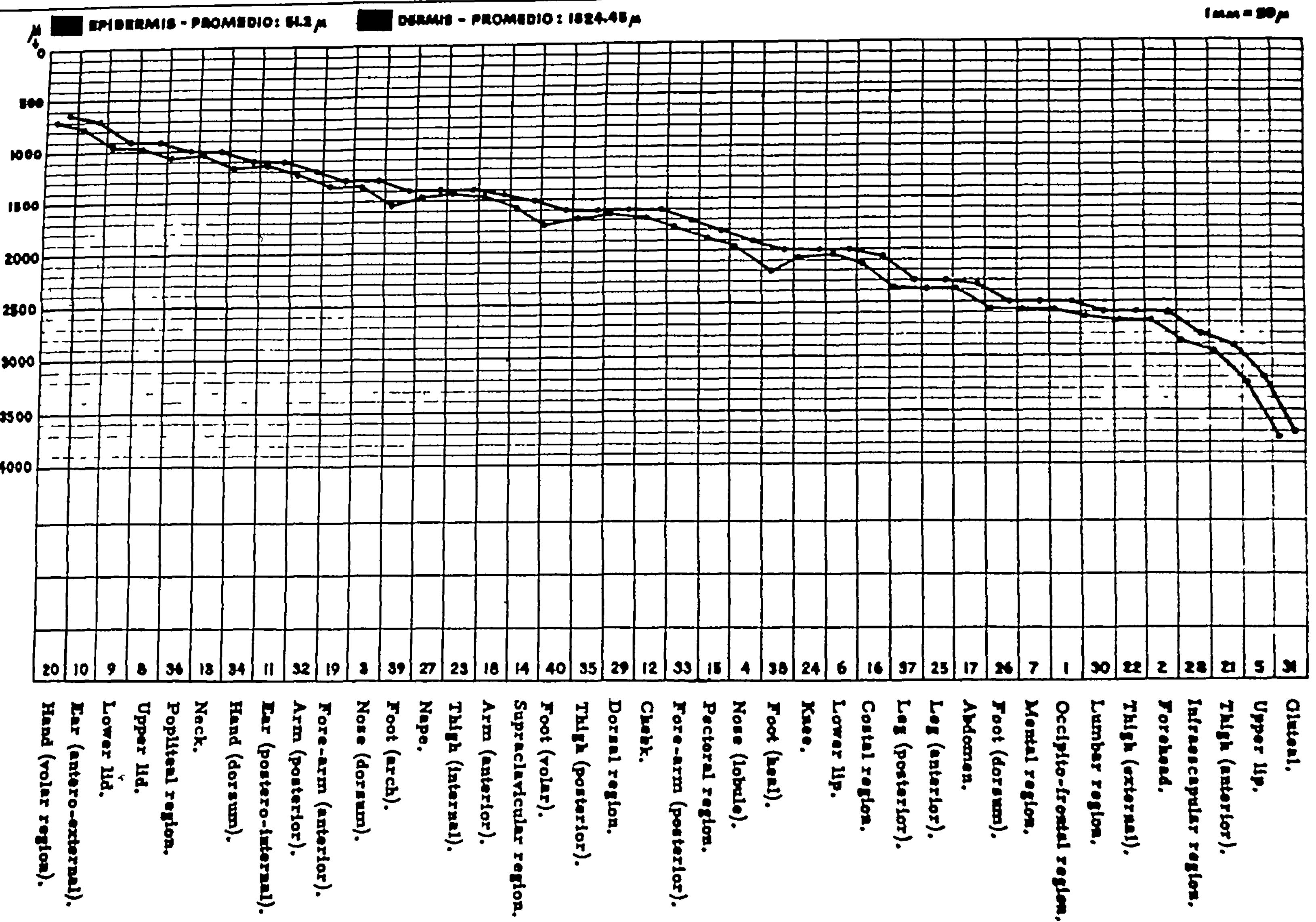

CADAVER C
SKIN THICKNESS IN SENESCENCE—(Epidermis-Dermis)
EPIDERMIS - PROMEDIO
DERMIS - PROMEDIO: 1824.45 μ
μ
0
500
1000
1500
2000
2500
3000
3500
4000
20 Hand (volar region).
10 Ear (antero-external).
9 Lower lid.
8 Upper lid.
36 Popliteal region.
13 Neck.
34 Hand (dorsum).
11 Ear (postero-internal).
32 Arm (posterior).
19 Fore-arm (anterior).
3 Nose (dorsum).
39 Foot (arch).
27 Nape.
23 Thigh (internal).
18 Arm (anterior).
14 Supraclavicular region.
40 Foot (volar).
35 Thigh (posterior).
29 Dorsal region.
12 Chebk.
33 Fore-arm (posterior).
15 Pectoral region.
4 Nose (lobule).
38 Foot (heal).
24 Knee.
6 Lower lip.
16 Costal region.
37 Leg (posterior).
25 Leg (anterior).
17 Abdomen.
26 Foot (dorsum).
7 Mental region.
1 Occipito-frontal region.
30 Lumbar region.
22 Thigh (external).
2 Forehead.
28 Infraescapular region.
21 Thigh (anterior).
5 Upper lip.
31 Gluteal.

Table G

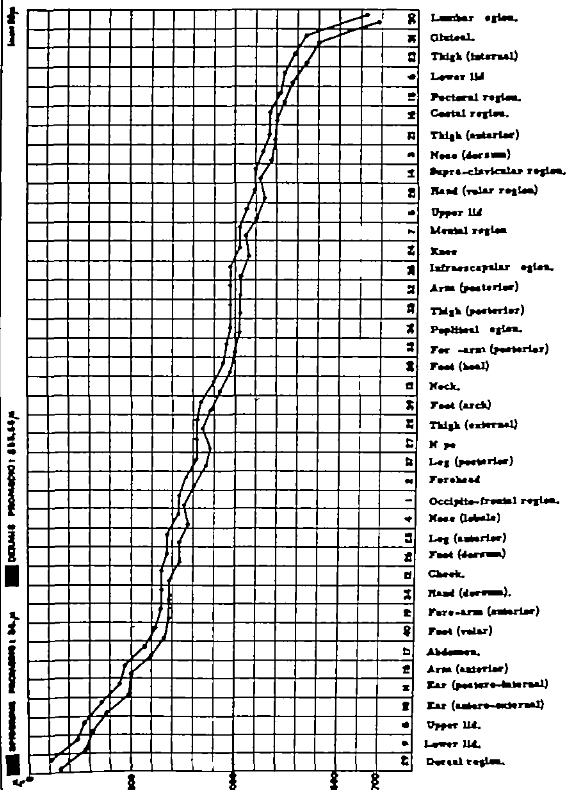

CADAVER D
SKIN THICKNESS IN A NEW-BORN—(Epidermis-Dermis)
Lumbar egion.
Gluteal.
Thigh (internal)
Lower lid
Pectoral region.
Costal region.
Thigh (anterior)
Nose (dorsum)
Supra-clavicular region.
Hand (volar region)
Upper lid
Mental region
Knee
Infrascapular egion.
Arm (posterior)
Thigh (posterior)
Popliteal egion.
For -arm (posterior)
Foot (heel)
Neck.
Foot (arch)
Thigh (external)
N pe
Leg (posterior)
Forehead
Occipito-frontal region.
Nose (lobule)
Leg (anterior)
Foot (dorsum)
Cheek.
Hand (dorsum).
Fore-arm (anterior)
Foot (volar)
Abdomen.
Arm (anterior)
Ear (postero-internal)
Ear (antero-external)
Upper lid.
Lower lid.
Dorsal region.

Table H

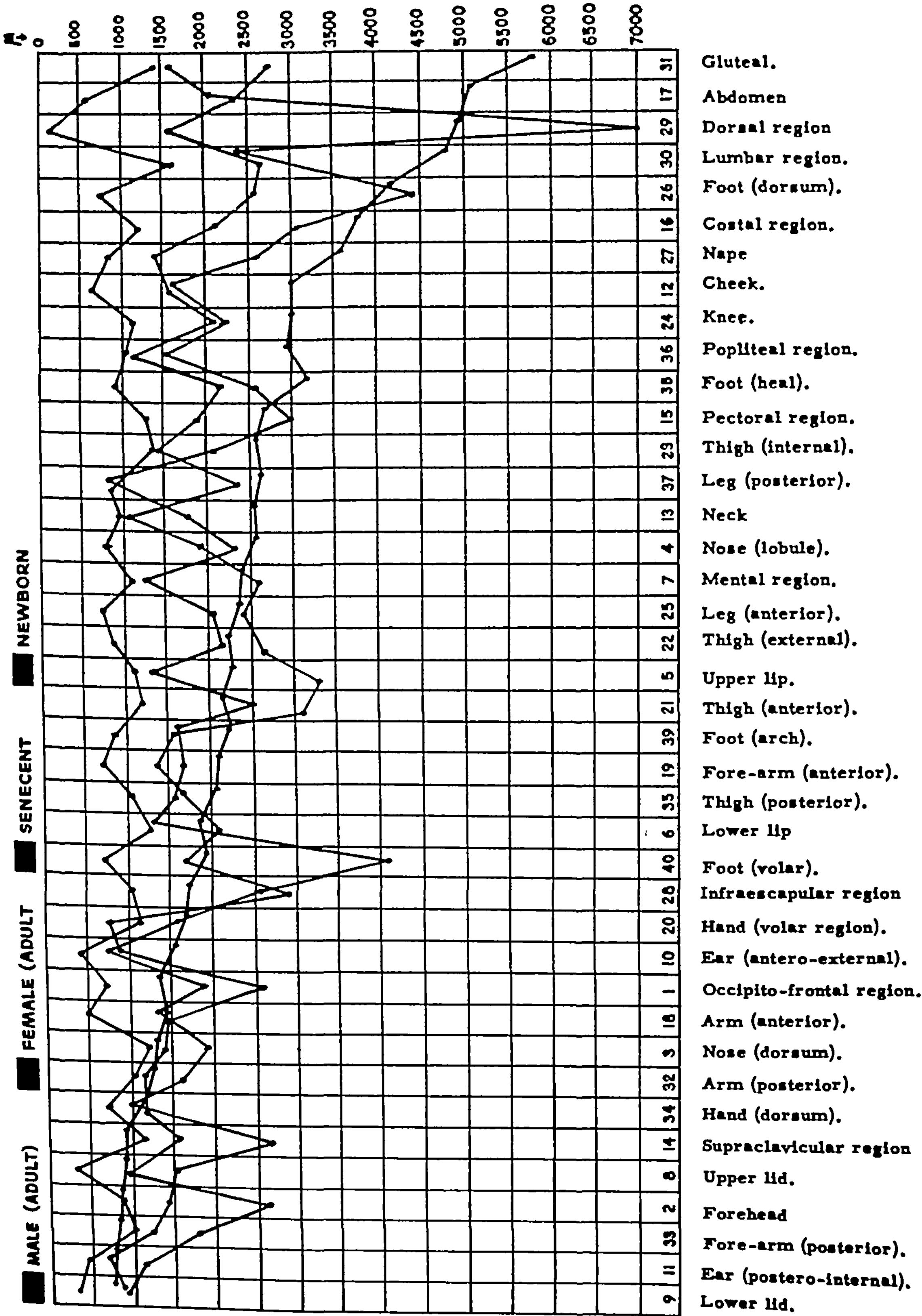

INTER-RELATION OF SKIN THICKNESS (USING MAN ADULT) AS THE NORMOTYPE
MALE (ADULT)
FEMALE (ADULT)
SENECENT
NEWBORN
μ 0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
6500
7000
31 Gluteal.
17 Abdomen
29 Dorsal region
30 Lumbar region.
26 Foot (dorsum).
16 Costal region.
27 Nape
12 Cheek.
24 Knee.
36 Popliteal region.
38 Foot (heal).
15 Pectoral region.
23 Thigh (internal).
37 Leg (posterior).
13 Neck
4 Nose (lobule).
7 Mental region.
25 Leg (anterior).
22 Thigh (external).
5 Upper lip.
21 Thigh (anterior).
39 Foot (arch).
19 Fore-arm (anterior).
35 Thigh (posterior).
6 Lower lip
40 Foot (volar).
28 Infraescapular region
20 Hand (volar region).
10 Ear (antero-external).
1 Occipito-frontal region.
18 Arm (anterior).
3 Nose (dorsum).
32 Arm (posterior).
34 Hand (dorsum).
14 Supraclavicular region
8 Upper lid.
2 Forehead
33 Fore-arm (posterior).
11 Ear (postero-internal).
9 Lower lid.

TABLE I

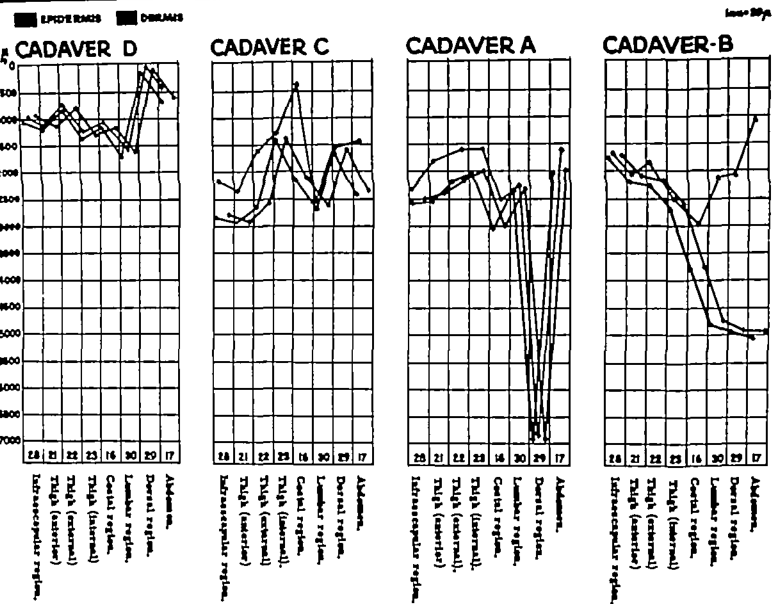

EPIDERMIS
DERMIS
CADAVER D
CADAVER C
CADAVER A
CADAVER-B
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
6500
7000
28 21 22 23 16 30 29 17
Infrascapular region.
Thigh (anterior)
Thigh (external)
Thigh (internal)
Costal region.
Lumbar region.
Dorsal region.
Abdomen.

TABLE J

the superficial network at the base of the papillae was clearly noticeable

Small tracts of fibres of smooth muscular tissue were frequently found in the dermis

The stain used in this study did not color the *nerve elements* and those we found were few

The *cellular elements* in the dermis were rarely observed, on the other hand, *epithelial elements* pertaining to hair follicles and sebaceous or sweat glands were constantly found in the dermis

The greatest depth attained by these elements is variable, but frequently they reach the bottom of the dermis (Table J)

In about fifty per cent of the regions studied, these epithelial elements were found at the surface and even going into the thickness of the subcutaneous tissue (Table K)

7 Mental region
14 Supraclavicular region
15 Pectoral region
16 Costal region
21 Thigh (anterior)
22 Thigh (external)
23 Thigh (internal)
24 Knee
29 Dorsal region
31 Gluteal
32 Arm (posterior)
33 Fore-arm (post)
34 Hand (dorsum)
35 Thigh (posterior)
36 Popliteal region
38 Foot (heel)
39 Foot (arch)
40 Foot (volar)

Having obtained the measurements of the skin in the forty regions of the four subjects of study, a table was made (Table L) in which the regions were listed according to the factor of occurrence

7 - Mental region	31 - Gluteal
14 - Supraclavicular region	32 - Arm (posterior).
15 - Pectoral region	33 - Fore-arm (post).
16 - Costal region	34 - Hand (dorsum)
21 - Thigh (anterior)	35 - Thigh (posterior).
22 - Thigh (external)	36 - Popliteal region.
23 - Thigh (internal)	38 - Foot (heel)
24 - Knee	39 - Foot (arch).
29 - Dorsal region	40 - Foot (volar).

TABLE K Regions in which epithelial elements were found in the hypodermis

of their respective absolute values Thus was attained a preliminary map of the skin thickness both in its absolute and relative values

The adult man, whose skin was thicker in the mean than that of the other subjects was taken as a standard for the comparison of the regional skin thicknesses In some regions it was observed that this selected standard thickness is exceeded by the woman, the senescent and the newborn (Table M)

The cutaneous regions which due to the thickness and richness of deep epithelial elements show to be most suitable to use as skin donors are, in order of thickness lumbar, costal, pectoral, thigh anterior, infrascapular, thigh internal, thigh external, abdomen and dorsal region

It was found that the indications given by different authors [3, 5, 6, 7, 8, 12, 13, 14, 17] referring to the thickness of skin grafts (Table N) are below the possibilities of the donor areas as measured in our study

To investigate the depth and amount of epithelial elements, histological cuts, parallel to the skin surface were made in the possible donor areas These investigations ascertained that the skin grafts could be made thicker in the indicated regions and in spite of that the donor areas could regenerate spontaneously and in a shorter time (Table J)

The direction of the section related to the Langer lines was not found to have any effect on either the thickness or the cutaneous characteristics of the specimens studied

In the different skin specimens of the same area no measurable difference was observed

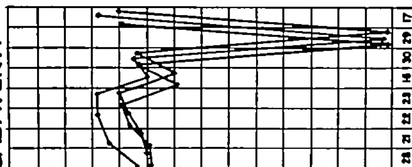
V Conclusions

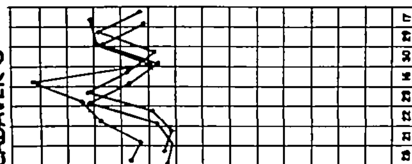
After a complete examination of the characteristics of the skin in four different subjects it can be ascertained that the epithelial covers of human beings have several variations of thickness in the following order Male (adult), female (adult) senescent and newborn

The observation was made that in the same subject the skin has several regional variations there being thick regions, average and thin regions

The existence of very thick regions, abundant in deep epithelial elements suggest them as good


CADAVER-B
17 Abdomen.
29 Dorsal region.
30 Lumbar region.
16 Costal region.
23 Thigh (internal)
22 Thigh (external)
21 Thigh (anterior).
28 Infrascapular region.


CADAVER A
17 Abdomen.
29 Dorsal region.
30 Lumbar region.
16 Costal region.
23 Thigh (internal)
22 Thigh (external)
21 Thigh (anterior)
28 Infrascapular region.


CADAVER C
17 Abdomen.
29 Dorsal region.
30 Lumbar region.
16 Costal region.
23 Thigh (internal)
22 Thigh (external)
21 Thigh (anterior)
28 Infrascapular region.

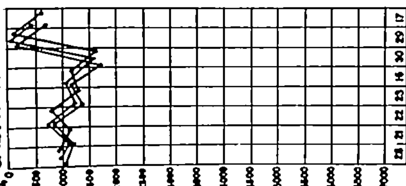

CADAVER D
EPIDERMIS
DERMIS
17 Abdomen.
29 Dorsal region.
30 Lumbar region.
16 Costal region.
23 Thigh (internal)
22 Thigh (external).
21 Thigh (anterior)
28 Infrascapular region.
0
500
1000
7000

TABLE J

FEMALE	SENESCENT	NEWBORN
Dorsal region.	Mental region	Supraclavicular region.
Foot (dorsum)	Leg	Fore-arm (posterior).
Foot (heel).	Thigh (exterior).	
Lower lip	Upper lip	
Infraescapular region.	Thigh (anterior)	
Occipito-frontal region		
Nose (dorsum).		
Supraclavicular region		
Upper lid		
Forehead		
Fore-arm		

TABLE M Thicker skins Using male (adult) as normatype

donor areas especially by their location in the posterior aspect of the body

The extreme differences of some neighboring areas suggest the need of improving—at least in the visible regions—the technique of their restoration selecting always a graft of similar thickness as that of the region intended to be repaired Furthermore, each region should be repaired as a whole—if good functional and esthetical results are to be attained Restoration done with a routine thickness graft set in the midpart of any determined region—as is done frequently—results in "patch surgery" which can and must be avoided

AUTHORS	THIERSCH	SPLIT	3/4 THICKNESS	WHOLE THICKNESS
PADGETT	250^{m} (0 08 - 0 010)	300^{m} - 400^{m} (0 012 - 0 016)	500^{m} - 600^{m} (0 018 - 0 022)	880^{m} - 1,000^{m} (0 030 - 0 038)
PADGETT Y SODERBERG	200^{m} - 250^{m}	200^{m} - 400^{m}	600^{m} - 700^{m}	800^{m} - 1,000^{m}
PADGETT				Tomados con escalpelo
Infant	180^{m} (0 007)	330^{m} - 360^{m} (0 013 - 0 014)		860^{m} (0 034)
Female (adult)		330^{m} - 360^{m} (0 013 - 0 014)		
Male (adult)	250^{m} (0 010)	250^{m} - 460^{m} (0 010 - 0 018)		710^{m} - 1,010^{m} (0 028 - 0 040)
PADGETT	200^{m} - 250^{m}	300^{m} - 500^{m}	600^{m} - 760^{m}	800^{m} - 1,140^{m}
CORACHAN				Reverdin 1,000^{m}
BEAUX	200^{m} - 300^{m}	300^{m} - 450^{m}		
MIR Y MIR	200^{m} - 250^{m}	300^{m} - 400^{m}		500^{m} - 600^{m}
PAVLOVSKY Y HARRIS	200^{m} - 250^{m}	350^{m} - 500^{m}	600^{m} - 760^{m}	800^{m} - 1,140^{m}
BUNNELL (Ref. Padgett)	200^{m} - 250^{m} (0 008 - 0 010)	300^{m} - 500^{m} (0 012 - 0 020)	600^{m} - 760^{m} (0 022 - 0 030)	800^{m} - 1,140^{m} (0 032 - 0 045)

m = micras

TABLE N Skin thickness for grafting

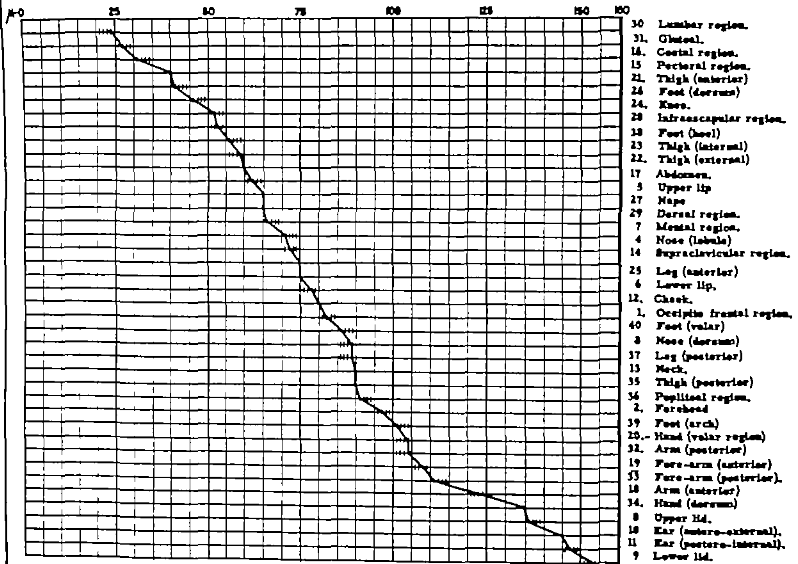

0
25
50
75
100
125
150
160
30 Lumbar region.
31. Gluteal.
14. Costal region.
15 Pectoral region.
21. Thigh (anterior)
26 Foot (dorsum)
24. Knee.
28 Infrascapular region.
38 Foot (heel)
23 Thigh (internal)
22. Thigh (external)
17 Abdomen.
5 Upper lip
27 Nape
29 Dorsal region.
7 Mental region.
4 Nose (lobule)
16 Supraclavicular region.
25 Leg (anterior)
6 Lower lip.
12. Cheek.
1. Occipito frontal region.
40 Foot (volar)
3 Nose (dorsum)
37 Leg (posterior)
13 Neck.
35 Thigh (posterior)
36 Popliteal region.
2. Forehead
39 Foot (arch)
20.- Hand (volar region)
32. Arm (posterior)
19 Fore-arm (anterior)
33 Fore-arm (posterior).
18 Arm (anterior)
34. Hand (dorsum)
8 Upper lid.
10 Ear (antero-external).
11 Ear (postero-internal).
9 Lower lid.

TABLE L

14 Banker, D E · Skin thickness in human Plast & Reconst Surg, 7 115-116, Feb 1951
15 Pinkus, H Examination of epidermis by strip method of removing horny layers, thickness of horny layer and mitotic activity after stripping J Invest Dermat, 16 383-386, June 1951
16 Hortsmann, E Papillary bodies of human skin and its regional differences Acta Anat, 14 23-42, 1952
17 Bunnell, S Surgery of the hand Lippincott Co, p 201, Oct 1952
18 Murtula, G Modification of the epidermis in relation to age with special reference to the difference between covered and uncovered skin Minerva Derm Tor, 7 231, Sept 28, 1953
19 Best, W R, and Laborat, J An improved caliper for measurement of skin fold thickness Clin M, 43 967-970, June 1954
20 Leider, M, and Buncke, C M Physical dimensions of the skin, determination of the specific gravity of skin, hair and nail Arch Derm Syph, 69 563-569, May 1954
21 Lasinski, W The configuration of epidermal ridges on the palms of Poles Przgl Anthrop, 18 159-236
22 Goldzieher, J W, Roberts, W B, Rawls, and Goldzieher, M A Chemical analysis of the intact skin by reflectance spectrophotometry Amer Med Ass Arch Derm Syph, 64 533-548
23 Gonzalez-Ulloa, M, Castillo, A, Stevens, E, and Alvarez Fuertes, G Preliminary study of the total restoration of the facial skin Plastic & Reconst Surg, 13 3, March 1954

Compte-rendu de Notre Etude sur l'Epaisseur de la Peau au Niveau de Toute la Surface de la Face et du Corps. MARIO GONZALEZ-ULLOA, EDUARDO STEVENS, GABRIEL ALVAREZ FUERTES ET FELIX LEONELLI

Une étude a été faite sur l'épaisseur et les caractéristiques histologiques de la peau dans 4 cas d un nouveau-né, une femme adulte, un homme adulte et un vieillard A l'aide de graphiques on montre l'épaisseur de la peau notée chez ces sujets, on indique séparément les chiffres pour le derme et l'épiderme

On a étudié les rapports de l'épaisseur de la peau dans différentes régions du corps et chez différents sujets

On a déterminé l'abondance et l'épaisseur des éléments épithéliaux qui conviennent pour réparer la peau

On a individualisé des zones donatrices efficaces en ce qui concerne l'épaisseur, l'accessibilité chirurgicale et l'épaisseur des éléments épithéliaux

On a montré l'existence des différences très notables quant à l'épaisseur entre des régions adjacentes de l'organisme Cela montre clairement la nécessité de la prise en considération des caractéristiques régionales dans les réparations cutanées de façon à obtenir un meilleur résultat tant du point de vue fonctionnel qu'esthétique

On a montré la possibilité d'augmenter la profondeur des greffes cutanées, une plus grande épaisseur favorisant un meilleur aspect esthétique tout en laissant en place suffisamment d'éléments épithéliaux pour une régénération spontanée

On fait remarquer que des lésions cutanées qui intéressent l'épiderme se trouvent réparées à partir des canaux et des corps des glandes épithéliales qui agissent en tant que noyaux multiples dans le processus de réparation

Bericht unserer Untersuchungen uber die Hautdicke der Gesamten Korperoberflache und des Gesichts. MARIO GONZALES-ULLOA, EDUARDO STEVENS, GABRIEL ALVAREZ FUERTES UND FELIX LEONELLI.

Eine Untersuchung uber Dicke und histologische Charakteristika der Haut wurde in 4 Fallen angestellt Einem Neugeborenen, einer erwachsenen Frau, einem erwachsenen Mann und einem Greise Kurven werden vorgefuhrt, die die Hautdicke zeigen, die in diesen Fallen gewonnen wurden, und die die Masze fur Dermis und Epidermis getrennt angeben

Die Beziehungen der Hautdicken von verschiedenen Korperstellen und der verschiedenen Individuen werden untersucht

Die Fulle und die Tiefe der epithelialen Elemente, die zum Ersatz von Haut geeignet sind, wurden festgestellt

Entnahmestellen, die bezuglich Dicke, chirurgischer Zuganglichkeit und der Tiefe epithelialer Elemente geeignet sind, wurden herausgestellt

Es wurde gezeigt, dasz sehr bemerkenswerte Unterschiede in der Dicke zwischen angrenzenden Korperregionen bestehen Hierdurch wird ganz deutlich die Notwendigkeit, regionare Charakteristika bei Hautersatz in Betracht zu ziehen, um ein besseres Ergebnis in funktioneller wie in aesthetischer Hinsicht zu erzielen

Die Moglichkeit, die Dicke des Hauttransplantates zu vergroszernda die groszere Dicke ein besseres aesthetisches Aussehen ergibt wurde demonstriert, wahrend fiugleich genugend epitheliale Elemente zur spontanen Regeneration am Platze (Entnahmestelle) belassen werden

Es wird die Tatsache bemerkt, dasz Hautlasionen, die die Epidermis betreffen, von den Gangen und Korpern der epithelialen Drusen aus regeneriert werden, die als multiple Kerne bei dem Wiederherstellungspozesz dienen

Reporte de Nuestro Estudio Sobre "Espesor Cutaneo de La Superficie de la Cara y Cuerpo." MARIO GONZÁLEZ ULLOA, EDUARDO STEVENS, GABRIEL ALVAREZ FUERTES Y FÉLIX LEONELLI

Los autores presentan un reporte de la experiencia obtenida al investigar el espersor de la

Normally each cutaneous region keeps its thickness and composition in its whole surface. Shifting skin from one region to another of different character may give a result defective both from the physiological and cosmetic points of view

Our findings in skin thickness seem to indicate that in order of preference the best donor areas are lumbar infrascapular abdominal and dorsal regions.

The existence of the epithelial cells at variable depths in the dermis should be always studied if the spontaneous healing of a destructive lesion of the skin is to be considered.

The study of the skin made us curious about understanding the histological nature and mechanism of the so called Langer lines A report on this subject will be made at a later date

According to the thickness found in our study the mean thickness of whole skin grafts can be increased with a corresponding cosmetic and functional advantage.

It needs hardly to be mentioned that there is a large number of factors which may influence the thickness and histological characters of the skin age genetic factors alimentation mechanical friction exposure and pathological factors.

SUMMARY

A study was carried out on thickness and histological characteristics of the skin in four cases a newborn a female an adult, a male adult and a senescent Graphs are given showing the skin thicknesses obtained in these subjects and indicating separately the measurements for the dermis and the epidermis

The relations between the skin thicknesses in different regions of the body and of the different subjects were sought.

The abundance and depth of the epithelial elements suitable for restoring skin were determined.

Donor areas efficient with regard to thickness surgical accessibility and depth of epithelial elements were singled out

Very noticeable differences of thickness were shown to exist between adjacent body regions. This clearly suggests the necessity of considerations of regional characteristics in skin repair in order to achieve a better result from the functional aesthetic point of view

The possibility was demonstrated of increasing the depth of skin grafts, the greater thickness favouring a better aesthetic appearance, while leaving in place sufficient epithelial elements for spontaneous regeneration

The fact is noticed that cutaneous lesions affecting the epidermis are repaired from the ducts and bodies of the epithelial glands which act as multiple centers in the process of regeneration.

Tuxpan 23
México 7 D.F Mexico

REFERENCES

1 Uphan, E and Landauer W Relation of thickness of cutis and subcutis to hair slope in human skin. Ant. Rec., 61.359-366 Feb 25 1935

2. Reinman S P., and Chatalbash, N Relative thickness of mouse skin treated with sulfhydryl (Thiocresol) disulfoxide (cystine disulfoxide) and dibenzanthracene Growth 1 247 249 Dec. 1937

3. Padgett, E. C Calibrated intermediate skin grafts. Surg. Gyn & Obst., 69 779-793 1939

4. Olin, T E. Thickness of stratum granulosum in various areas relation of thickness of other layers of epidermis. Arb Ad. Path. Inst. de Univ Helsingfors, 10 431-455 1942

5 Padgett, E. C., and Soderberg N B Three fourths graft and other thickness cut with dermatome Dia. Med., 14 8-14 Jan. 1942

6 Pavlovsky A J and Harris, M. M Free grafts (calles intermediate and transchorionic) using Padgett Dermatome Semana Méd., 2 709-713 Sept. 24 1942

7 Padgett, E. C Indications for determination of thickness for split grafts. American J Surg., 72 683-693, Nov 1946

8. Stuart, H C and Sobel E. H. Thickness of skin and subcutaneous tissue by age and sex in childhood J Pediat., 28 637-647 June 1946

9 Bullough, H. F Epidermial thickness following estrone (estrogen) injections in mouse. Nature London, 159 101 102 Jan. 18, 1947

10 Meredith H. V., and Stuart, H C Use of body measurements in school health program supplementary note supplying measurements and rating equivalents for thickness of skin and subcutaneous tissue below left scapula and above left ilium. Am. J Pub Health, 37 1435-1438, Nov 1947

11 Beaux, A. R. Classification of grafts selection of type. Dia. Med 20 1647 Aug. 5 1948.

12. Corachan M and Baquero R. Basal grafts (Corachan technic) Prensa Médica Argentina, 37 459-469 1950

13. Mir Y Mir L. Definition and classification grafts. Actas Demosif., 42 660-668, April 1951

plantates vergleichbar ist Eine Unterlage ist speziell dafur hergestellt worden und Dermatape genannt worden

Los Principios Básicos en el Éxito del Injerto de Piel. John D Reese

Los injertos de mediano espesor o de espesor completo sobreviven porque realizan primero la función fisiológica de aceptar y guiar el flujo de la linfa del lecho receptor a travéz del medio de la malla de su tejido conectivo y regreso hacia los linfáticos del área receptora

Dado que las leyes físicas gobiernan el flujo de la linfa, la presión externa es muy necesaria, aunque la cantidad total sea pequeña La distribución de esta pequeña cantidad de presión, sin embargo, es muy importante Debe ser distribuida microscópicamente sobre cada célula y espacio tisular, debe realizarse la coaptación perfecta de los espacios tisulares adyacentes del injerto y del lecho receptor

El principio, relacionado con el control de fluidos es llamado "Principio de Plomero" y la solución es un apoyo para el injerto, cuya estructura molecular es comparable en medida a la estructura celular del injerto Se ha diseñado un apoyo especial y se ha denominado Dermatape

---

Observations on Experimental Skin Homografts in Man. John Marquis Converse, M D and Felix T Rapaport, M D * *From the Plastic Surgery Unit, Department of Surgery, New York University College of Medicine*

Until a few years ago the events that took place after transplantation of a skin homograft which led to the final rejection of the homograft, were obscure Was the homograft revascularized like an autograft? What was the nature of the rejection of the skin homograft? It is our intention in this paper to report data obtained from observations of experimental skin autografts and homografts in man

The Vascularization of Skin Autografts and Homografts in Man

The behavior of skin autografts in man has been studied by Thiersch (1874), Garre (1888), Huebscher (1888), Goldman (1890) and Davis and Traut (1925) The revascularization of skin grafts was thought to occur as a result of two different processes (1) a direct mouth-to-mouth apposition of host and graft vessels termed inosculation by the German authors, (2) an ingrowth of host vessels into the graft Huebscher (1888) and Goldman (1890) suggested the term "plasmatic circulation" to define the mode of nutrition of skin grafts before the establishment of a direct connection between the vasculature of the host and that of the graft This process implies the filling of graft vessels with nutrient fluid from the host bed

Studies of skin homografts first suggested that the homograft was not revascularized (Conway, Joslin, Reese and Stark, 1952, Ham, 1952) Taylor and Lehrfeld (1953) by means of a direct stereomicroscopic technique developed in our laboratories, reported that skin homografts became vascularized in rats and mice Gibson and Medawar (1942) and Scothorne and McGregor (1953) reported histological evidence of homograft vascularization in rabbits and McGregor (1955) by an injection of a dye confirmed the vascularization of skin homografts in man Medawar (1948) and Billingham and Boswell (1953) demonstrated survival of grafts in the absence of vascularization but stressed the importance of vascularization as a prerequisite to graft rejection In our studies gross observations and direct stereomicroscopic studies of the vascularization of experimental skin autografts and homografts were undertaken in human volunteers and were reported recently (Converse and Rapaport, 1956)

Stereomicroscopic observation of the blood vessels of the skin was first done by Lombard (1912) and extensively employed by Lewis (1927) Stereomicroscopy permits daily observation of the superficial blood vessels of the skin as well as observation of the epidermis, papillary ridges, sebaceous glands and hair follicles

The arrangement of the cutaneous vessels has been described by Spalteholz (1893, 1927) The arteries supplying the skin form at the junction of the dermis and subcutaneous fat a characteristic cutaneous arterial network From this network arched and branching vessels form a sub-papillary arterial plexus Numerous small branches arise from the sub-papillary plexus, the *terminal arterioles* to the superficial layers of dermis, sending twigs to the arterial limbs of the capillary loops in the dermal papillae The venous blood returning from the dermal

* This experimental research was supported by a grant from the Atomic Energy Commission

totalidad de la superficie cutánea de varios cadáveres de diferentes edades.

El objetivo de su estudio fué programar una base científica para la selección de los transplantes de piel

El estudio incluye las medidas de espesor de la piel en diferentes edades y sexos los promedios de espesor y una descripción de los caracteres histológicos de la piel en toda la superficie cutánea con sugestiones sobre el procedimiento ideal para la reconstrucción.

The Basic Principles Underlying a Successful Skin Graft JOHN DAVIES REESE, M D, Professor *2037 Locust Street Philadelphia 3, Pa, U S A*

Split or full thickness free grafts survive because they primarily perform a physiological function. All other grafts—cartilage, bone etc—depend for survival upon being so situated in their recipient beds that they receive adequate nourishment

Not so a skin graft it is not buried in a pocket of tissue which provides nourishment The skin graft if it is to remain viable, must perform the function of controlling and guiding the ever persistent ooze of lymph from the recipient bed Scar tissue controls the lymph flow by acting as a seal the graft acts as a turn-around agent for the lymph flow

The connective tissue stroma of the skin graft is the essential structure which provides a physiological pathway for the lymph. The stroma by physical laws accepts it from the exuding bed carries it outward through its layers to meet the keratinized layers of the epidermis Here, as in the normal skin function, the lymph is turned about and returned to the lymphatic circulation The fate of the cellular elements both color and epithelial, is wholly dependent upon how efficiently the connective tissue pathways transmit the lymph.

The problem then is to apply the graft to the recipient bed in such a manner that the physical laws governing the flow of lymph will be permitted to operate. External pressure is a very important factor though the sum total of such pressure is very tiny The *distribution* of this small amount of pressure however is all important. It must be *microscopically* distributed over each cell and tissue space it must accomplish *microscopic* coaptation of the adjacent tissue spaces of the graft and the recipient bed

A solution of the problem is submitted and, since it concerns the control of the lymphatic fluid we have called the concept a Plumbing Principle

Principes qui sont a la Base de la Reussite d'une Greffe Cutanée. JOHN D REESE.

Les greffes dermo-épidermiques ou de pleine peau survivent parce que elles accomplissent d'une façon primaire la fonction physiologique de réception et de guidage du flux de lymphe à partir du lit récepteur avec retour vers les lymphatiques de l'hôte par l intermédiaire de leur tissu conjonctif

Pour que les lois physiques qui président au flux de la lymphe puissent agir il est indispensable d exercer une pression externe sans que la totalité de la pression exercée ait besoin d'être excessive. Toutefois la *répartition* de cette petite quantité de pression est importante Elle doit être répartie microscopiquement sur chaque cellule et sur chaque espace tissulaire elle doit réaliser une coaptation microscopique des espaces tissulaires adjacents du greffon et du lit récepteur

Le principe impliqué, du fait qu il s agit surtout d'un contrôle liquidien se nomme principe du plombage et la solution est en somme un renforcement de la greffe dont la structure molléculaire est comparable dans ses dimensions avec la structure cellulaire On a spécialement élaboré un pétrisseur que l on a dénommé dermatape

Die einer Erfolgreichen Hauttransplantation Zu grundeliegenden Prinzipien. JOHN D REESE.

Frei transplantierte Spalt oder Vollhautlappen überleben weil sie primär die physiologische Funktion erfüllen den Lymphstrom aus dem Transplantatbett aufzunehmen ihn später durch sein Bindegewebegerüst zu leiten und es den Lymphgefässen des Empfängers wiederzuzuführen.

Damit die physikalischen Gesetze die dem Lymphstrom zugrunde liegen zur Geltung kommen, ist äusserer Druck dringend notwendig, wenngleich er insgesamt sehr gering sein kann. Die Verteilung dieses geringen Druckes hingegen ist von grosser Wichtigkeit. Er muss mikroskopisch über jede Zelle und jeden Gewebszwischenraum verteilt sein Er muss eine mikroskopisch genaue Anlagerung der angrenzenden Gewebstücken des Transplantates und des Transplantatbettes bewirken

Das in Frage stehende Prinzip wird da es hauptsächlich mit der Flüssigkeitskontrolle zu tun hat Plumbing Prinzip genannt und die Lösung des Problems liegt darin dass für das Transplantat eine Unterlage geschaffen wird, deren molekulare Struktur grössenmässig der Zellstruktur des Trans-

define the allergic state and the types of allergic reactions observed

According to Chase (1952) the term allergy signifies an altered capacity to react as judged from previous experiences of the same individual or from experiences of other individuals of the species The alteration is specific, usually reflecting prior contact with the same material It is reasonable to assume that the body possesses a multiplicity of entirely independent mechanisms for the recognition of substances that it has previously encountered Aside from circulating antibodies it is possible that one is dealing, in certain cases, with cell-bound intracellular antibodies

Allergic reactions fall into two chief categories not always sharply separable—the immediate and the delayed types These have also been epitomized respectively as the "urticarial" and "tuberculin" types of reactions In the immediate type of allergic reaction circulating antibodies are demonstrable and there is accompanying skin reactivity in the form of a "wheal and erythema" response where the allergin is applied This skin reactivity assists in the recognition of the allergen In the delayed type reactions circulating antibodies are but rarely found and the fact that sensitivity to tuberculin has been transmitted through peripheral blood leucocytes (Chase 1945, Lawrence 1956) suggests that the antibodies are cell bound and intracellular There are analogies between tuberculin-type hypersensitivity and the homograft rejection, these were summarized in a table by Lawrence (Table I)

It was long suspected that serum antibodies were also present in the homograft rejection reaction A recent report by Bollag (1956) suggesting that tissue antibodies can be demonstrated in the serum of rabbits following a skin homograft appears to confirm this suspicion

The duration of sensitivity to skin homografts in other species has been described by Medawar (1944-46), Billingham, Brent and Medawar (1954) and Lehrfeld, Taylor and Converse (1955)

Recent investigations in our laboratories (Rapaport and Converse, 1956) have yielded interesting data concerning the reactions to repeated skin homografts from the same donor in order to evaluate the duration of the resulting sensitivity

(1) A homograft from a donor A was transplanted to a recipient This graft was rejected as a first-set homograft Twenty-one days later a second homograft from a different donor B was transplanted to the same recipient This second homograft from a different donor also reacted as a first-set homograft Such an experiment demonstrates that the sensitivity produced by the homograft is a specific one (Table II) (2) Three additional skin homografts from donor B were applied to the same recipient at varying time intervals The second graft was applied 12 days after rejection of the first, the third graft was applied 26 days after rejection of the second, the fourth graft was applied 22 days after rejection of the third

Each of the homografts from donor B applied after rejection of the first homograft from the same donor was the subject of an accelerated rejection occurring within the fourth to fifth postoperative day in the manner characteristic

TABLE I*

	Tuberculin type hypersensitivity	Homograft rejection hypersensitivity
Induction of sensitivity	Intact bacterial cells	Intact tissue cells
Latent period	10-14 days	10-12 days
Result of challenge	Koch phenomenon	Accelerated rejection
Specificity	For specific bacterium	For specific donor
Presence of measurable serum antibody	Variable	Variable
Parallelism between degree of sensitivity and serum antibody	Not demonstrated	Not demonstrated
Transfer of sensitivity with serum	Negative	Negative
Transfer of sensitivity with cells	Positive	Positive
Cytotoxicity of antigen for explanted cells	Present	None

* "Analogies between tuberculin type hypersensitivity and homograft rejection," by H S Lawrence from Second Conference on Tissue Homotransplantation, New York Academy of Sciences—a monograph in press (1956)

papillae flows through three successive venous networks to a network at the level of the junction of dermis and subcutaneous fat. Spalteholz (1927) described the arteries of the cutaneous network as possessing a thick muscular coat which diminishes in size in the more superficial arterioles lined by a single layer of muscle cells. The superficial capillaries are formed of endothelium only according to Spalteholz (1927) Vintrup (1923) believes that the muscular coat is replaced in these capillaries by contractile Rouget's cells. Muscle layers appear in the deeper veins valvules and a full muscular coat are seen in the vessels of the subdermal venous plexus

Lewis (1927) designated as the *minute vessels* the terminal arterioles capillaries collecting venules and the subpapillary venous plexus vessels that are visible in the skin *in vivo* Stereomicroscopy permits observation of these superficial *minute vessels* As Spalteholz believes that there are no communications between the arterial and venous sides of this vascular system the presence of hemic flow in the superficial vessels is evidence of adequate revascularization of the graft

Daily stereomicroscopic observations of skin autografts and homografts reveal that the revascularization process of both autografts and homografts is similar As early as 24 hours after implantation of the graft vessels which have become dilated and filled with static blood are observed. These dilated vessels have been interpreted by us as being the original vessels of the graft. A sluggish flow of blood was observed by the third or fourth day By the fifth or sixth day fine-calibered vessels had appeared which exhibited active blood flow These fine-calibered vessels may be new vessels growing from the host bed, which gradually replace the previously observed dilated blood vessels of the graft These stereomicroscopic observations were confirmed by histological sections which show side-by-side the old degenerated blood vessels and fine-calibered new vessels.

No differences were detected in the appearance of autograft and homograft during the first five postoperative days. Progressive changes began to appear hereafter in the vessels of the homograft which exhibited progressive dilatation and diminishing blood flow The blood flow lessened and ceased during subsequent days and multiple punctate thrombi were noted along the course of the vessels Rupture of the vessel walls with extravasation of blood followed.

Gross observations in skin homografts revealed that during the first 48 hours after implantation an area of erythema is noted around the graft which is interpreted as the inflammatory process accompanying wound healing This erythema which we have designated as the *primary erythema*, gradually disappears

At the time of the rejection of the skin homograft, often as a premonitory sign of rejection, a *secondary erythema* frequently heralds the cessation of flow in the vessels observed stereomicroscopically The appearance of this secondary erythema and arrest of flow in the vessels is followed by gross changes in the homograft consisting in cyanosis, edema of the graft and often of the surrounding area, leading to the final escharification of the homograft.

The events leading to final sloughing of the skin homograft assume an orderly progression over a period of 1-3 days which we have named the *homograft rejection period* While the first appearance of cessation of flow in the vessels of the homograft is a useful endpoint in evaluating survival time it is only one of the events leading to the final rejection of the graft.

Observations on Immunologic Manifestations of Homograft Rejection Phenomenon in Man

Immunologic aspects of the rejection of skin homografts have been reported by Medawar (1954) and Billingham Brent and Medawar (1954) These authors describe the active sensitization pattern expressed by the host's reaction to transplants and also the host's behavior when placed in contact with an antigenic challenge from the same source. Second-set homografts have exhibited an accelerated form of rejection in the species studied (Gibson & Medawar 1942 Medawar 1944, 1945 1946 Dempster Lennox and Boag 1950 Baxter & Entin 1951 Longmire & Smith 1951 Dempster 1952 Sparrow 1953 Lehrfeld Taylor & Converse 1955)

Medawar (1954) suggested a resemblance between the homograft rejection phenomenon and the events leading to the development of hypersensitivity of the delayed bacterial type For purposes of clarification it may be useful to

12 Gibson, T, and Medawar, P B J Anat, 77 299, 1942
13 Goldman, E Centralbl F allg Path u Path Anat, 1 505, 1890
14 Ham, A W J Bone & Joint Surg, 34A 701, 1952
15 Huebscher, C Beitra z Klin Chirurg, 4 395, 1888-1889
16 Lawrence, H S Sec Tiss Homotrans Conf, N Y Academy of Sciences, Feb 1956 (In Press)
17 Lehrfeld, J N Taylor, A C, and Converse, J M J Plast & Reconstr Surg, 15 74, 1955
18 Lewis, T The blood vessels of the skin Shaw & Sons, London, 1927
19 Lombard, W P Am J Physiol, 29 335, 1911-1912
20 Longmire, W P Jr and Smith, S W Arch Surg, 82 483, 1951
21 McGregor, I A Brit J Plast Surg, 7 331, 1955
22 Medawar, P B J Anat, 78 176 1944, J Anat, 79 157, 1945, Brit J Exp Path, 27 9, 1946, Brit J Exp Path, 29 58, 1948, Ciba Foundation Symposium, pp 1-22, London, 1954
23 Rapaport, F T, and Converse, J M Sec Tiss Homotrans Conf, N Y Academy of Sciences, Feb 1956 (In Press)
24 Scothorne, R J, and McGregor, I A J Anat, 8 379, 1953
25 Spalteholz, W Arch F Anat u Physiol, 1 54, 1893, Handb d Haut u Geschtskr, 1 379, 1927
26 Sparrow, E M J Endocrin, 9 101, 1953
27 Taylor, A C, and Lehrfeld, J W Plast & Reconst Surg, 12 423, 1953
28 Thiersch, K Arch F klin, Chirurg, 17 318, 1874
29 Vimtrup, B Zeitschr f Anat u Entwicke-lungsg Bed, 68, 1923

Observations sur les Homogreffes Cutanées Expérimentales chez l'Homme. JOHN MARQUIS CONVERSE ET FELIX RAPAPORT

Des études ont été faites au cours des 3 dernières années sur le comportement clinique, le mode de vascularisation et les modifications histologiques qui se voient tant dans les autogreffes que les homogreffes de peau totale chez l'homme

La suite des évènements qu'il s'agisse des autogreffes ou des homogreffes est semblable pendant une période d'environ une semaine On note un comportement parallèle dans l'aspect macroscopique, l'établissement de la circulation dans le capillaire du greffon et l'image histologique tant des autogreffes que des homogreffes

Vers le 6e jour, la circulation capillaire devient moins active et un processus de thrombose s'établit graduellement qui entraîne la nécrose du greffon et son expulsion par l'autre

On a également fait des observations sur des homogreffes après un second prélèvement chez le même donneur et il a été trouvé qu'elles étaient expulsées plus rapidement par le donneur Ces observations confirment le phénomène du 2e prélèvement décrit par Medawar chez le lapin et constitue un des arguments qui tend à expliquer l'expulsion de l'homogreffe par l'établissement d'une immunité acquise chez l'autre

Beobachtungen bei Experimentellen Haut-Homotransplantaten bei Menschen. JOHN MARQUIS CONVERSE UND FELIX RAPAPORT

Wahrend der letzten drei Jahre wurden Studien uber das klinische Verhalten, die Art der Vascularisation und die histologischen Geschehnisse bei experimentellen Vollhaut- Auto- und Homotransplantaten bei Menschen angestellt

Die Reihenfolge der Ereignisse ist sowohl im Auto als auch im Homotransplantat wahrend eines Zeitraumes von ungefahr einer Woche ahnlich Es besteht das gleiche Verhalten in dem ganzen Erscheinungsbild, in der Herstellung des Stromens in den Transplantatkapillaren und in den histologischen Bildern eines Autotransplantates sowie eines Homotransplantates

Um den sechsten Tag herum wird die Stromung in den Kapilaren weniger lebhaft und ein thrombotischer Prozess findet allmahlich statt, der zur Nekrose des Transplantates und seiner Abstossung durch den Empfanger fuhrt

Ausserdem wurden Beobachtungen ebenfalls an Zweitempflanzungen von Homotransplantaten des gleichen Spenders gemacht, bei denen festgestellt wurde, dass sie noch schneller von dem Empfänger abgestossen wurden

Diese Beobachtungen bestatigen das Phanomen der Zweittransplantation, die von Medawar am Kaninchen gemacht wurden und bilden einen der Einwande gegen die Feststellung, dass die Abstossung des Homotransplantates auf der Bildung aktiver Immunitat beruht

Observaciones en Homoinjertos Experimentales en el Hombre. JOHN MARQUIS CONVERSE Y FELIX RAPAPORT

En los últimos 3 años se ha estudiado el comportamiento clínico el mecanismo de vascularización y los eventos histólógicos en homoinjertos y autoinjertos experimentales de todo espesor en el hombre

La secuencia de eventos en ambos es similar durante un periodo aproximado de una semana La conducta es paralela en la apariencia, en el paso de capilares y en el cuadro histológico

Alrededor del sexto día el flujo capilar disminuyemientras gradualmente se establece un proceso trombótico que lleva a la necrosis del injerto a su repulsión por los tejidos receptores

Se hicieron observaciones en un segundo grupo de homoinjertos que fueron rechazados mas rapidamente por el recipiente Estas observaciones confirman los fenómenos descritos por Medawar en el conejo y constituyen uno de los argumentos de

TABLE II

Source of homograft	Time interval (days)	Homograft rejection period
Donor A	0	6-7
Donor B	21	9-10
Donor B	12	4
Donor B	26	4-5
Donor B	22	4-5
Donor B	30	9-10

of the second-set graft Blood flow was observed in the second and fourth-set grafts only

These observations are in accord with previously reported manifestations of the second-set reaction Challenge of a recipient with a skin homograft from one donor seems to result in the development of a specific generalized sensitivity to the donor's skin which is evidenced by an accelerated rejection of subsequent homografts from the same donor but not from other donors When the state of sensitivity has been attained it is not enhanced further in terms of more rapid rejection. Subsequent skin grafts from the same donor are rejected in a similar fashion to that observed in the second-set homograft

(3) A fifth-set graft applied 80 days after rejection of the fourth-set graft was rejected by the ninth to the tenth postoperative days in the manner therefore characteristic of a first set graft. The recipient did not react in an accelerated fashion to fifth-set homograft from donor B but reverted to a first-set rejection pattern similar to that of the first-set graft from the same donor It thus appears that the fifth set homograft, 80 days after the rejection of the fourth-set homograft conducted itself as a first-set homograft because it was applied after the recipient had lost his sensitivity to the donor's skin homograft

The Recall Flare Reaction

The process of rejection of the second, third and fourth-set grafts from donor B was associated with a unique phenomenon not previously reported in skin transplantation studies The site of the preceding rejected homograft on the contralateral arm up to the time of rejection of the second third and fourth-set graft was quiescent and well-covered with host epithelium At the height of the rejection reaction of each graft however this site exhibited a vigorous erythematous flare In one instance the flare progressed to intra-dermal hemorrhage and necrosis In a number of cases the flare was associated with intense pruritus This recall flare reached maximal intensity within one day after the onset of the rejection changes of the subsequent graft subsided within 48 hours and returned to a quiescent stage and was observed only once At the time of the maximal rejection of the fifth-set graft the site of the fourth-set graft failed to show any flare reaction. This fact would seem to suggest that the recipient's sensitivity to skin grafts from donor B was lost between the 26th and 80th day after application of the last sensitizing graft The flare reaction observations which can be interpreted as the result of the persistence at the rejected graft site of sufficient antigenic material to allow for the development of a new reaction when the individual is challenged at another site parallels the events observed in sensitivity of the delayed type.

Summary

1 Observations on the vascularization of skin autografts and homografts in man are given and the homograft rejection period is defined.

2 Some immunological manifestations of the homograft rejection phenomenon are reviewed, in particular the duration of the state of sensitivity to homografts in man

References

1 Baxter H and Entin, M A Am. J Surg., 81 283 1951
2 Billingham, R E., and Boswell T Proc. Roy Soc 141B 392 1953.
3 Billingham R. E., Brent L and Medawar P B Proc Roy Soc 143 58 1954
4. Bollag W S. Transplan. Bull. Vol., 3 43 April 1956
5 Chase, M H Proc Soc Exp Biol and Med 59 134 1945
6 Converse J M and Rapaport F T Annals of Surg., 143 306, March 1956
7 Conway H Joslin D Rees, T D., and Stark, R. B J Plast & Recon. Surg., 9 557 1952
8. Davis, J S and Traut H. F Ann Surg 82 871 1925
9 Dempster W J Brit J Plast Surg., 5 228 1952 1953.
10 Dempster W J., Lennox B and Boag, J Brit. J Exp Path., 31 670 1950
11 Garré, C Bruns Beitr z Klin Chirurg., 4 625 1888

12 Gibson T, and Medawar, P B J Anat, 77 299, 1942
13 Goldman, E Centralbl F allg Path u Path Anat 1 505, 1890
14 Ham, A W J Bone & Joint Surg, 34A 701, 1952
15 Huebscher C Beitr z Klin Chirurg, 4 395, 1888-1889
16 Lawrence, H S See Tiss Homotrans Conf, N Y Academy of Sciences, Feb 1956 (In Press)
17 Lehrfeld, J N Taylor, A C, and Converse J M J Plast & Reconstr Surg, 15 74, 1955
18 Lewis, T The blood vessels of the skin Shaw & Sons, London 1927
19 Lombard W P Am J Physiol 29 335, 1911-1912
20 Longmire, W P Jr, and Smith, S W Arch Surg, 82 483, 1951
21 McGregor, I A Brit J Plast Surg, 7 331, 1955
22 Medawar P B J Anat, 78 176 1944, J Anat, 79 157 1945, Brit J Exp Path, 27 9, 1946, Brit J Exp Path 29 58, 1948, Ciba Foundation Symposium, pp 1-22, London, 1954
23 Rapaport, F T, and Converse, J M See Tiss Homotrans Conf N Y Academy of Sciences, Feb 1956 (In Press)
24 Scothorne R J, and McGregor, I A J Anat, 8 379, 1953
25 Spalteholz, W Arch F Anat u Physiol, 1 54, 1893, Handb d Haut u Geschtskr, 1 379, 1927
26 Sparrow, E M J Endocrin, 9 101, 1953
27 Taylor, A C, and Lehrfeld, J W Plast & Reconst Surg, 12 423, 1953
28 Thiersch, K Arch F klin, Chirurg, 17 318, 1874
29 Vimtrup, B Zeitschr f Anat u Entwicke-lungsg Bed, 68, 1923

Observations sur les Homogreffes Cutanées Expérimentales chez l'Homme. JOHN MARQUIS CONVERSE ET FELIX RAPAPORT

Des études ont été faites au cours des 3 dernières années sur le comportement clinique, le mode de vascularisation et les modifications histologiques qui se voient tant dans les autogreffes que les homogreffes de peau totale chez l'homme

La suite des évènements qu'il s'agisse des autogreffes ou des homogreffes est semblable pendant une période d'environ une semaine On note un comportement parallele dans l'aspect macroscopique, l'établissement de la circulation dans le capillaire du greffon et l'image histologique tant des autogreffes que des homogreffes

Vers le 6e jour, la circulation capillaire devient moins active et un processus de thrombose s'établit graduellement qui entraîne la nécrose du greffon et son expulsion par l'autre

On a également fait des observations sur des homogreffes après un second prelèvement chez le même donneur et il a été trouvé qu'elles étaient expulsées plus rapidement par le donneur Ces observations confirment le phénomène du 2e prélèvement décrit par Medawar chez le lapin et constitue un des arguments qui tend a expliquer l'expulsion de l'homogreffe par l'établissement d'une immunité acquise chez l'autre

Beobachtungen bei Experimentellen Haut-Homotransplantaten bei Menschen. JOHN MARQUIS CONVERSE UND FELIX RAPAPORT

Während der letzten drei Jahre wurden Studien über das klinische Verhalten die Art der Vascularisation und die histologischen Geschehnisse bei experimentellen Vollhaut- Auto- und Homotransplantaten bei Menschen angestellt

Die Reihenfolge der Ereignisse ist sowohl im Autoals auch im Homotransplantat während eines Zeitraumes von ungefähr einer Woche ähnlich Es besteht das gleiche Verhalten in dem ganzen Erscheinungsbild, in der Herstellung des Stromens in den Transplantatkapillaren und in den histologischen Bildern eines Autotransplantates sowie eines Homotransplantates

Um den sechsten Tag herum wird die Stromung in den Kapillaren weniger lebhaft und ein thrombotischer Prozess findet allmahlich statt, der zur Nekrose des Transplantates und seiner Abstossung durch den Empfanger fuhrt

Ausserdem wurden Beobachtungen ebenfalls an Zweitempflanzungen von Homotransplantaten des gleichen Spenders gemacht, bei denen festgestellt wurde, dass sie noch schneller von dem Empfänger abgestossen wurden

Diese Beobachtungen bestatigen das Phanomen der Zweittransplantation, die von Medawar am Kaninchen gemacht wurden und bilden einen der Einwande gegen die Feststellung, dass die Abstossung des Homotransplantates auf der Bildung aktiver Immunitat beruht

Observaciones en Homoinjertos Experimentales en el Hombre. JOHN MARQUIS CONVERSE Y FELIX RAPAPORT

En los últimos 3 años se ha estudiado el comportamiento clínico el mecanismo de vascularización y los eventos histólógicos en homoinjertos y autoinjertos experimentales de todo espesor en el hombre

La secuencia de eventos en ambos es similar durante un periodo aproximado de una semana La conducta es paralela en la apariencia, en el paso de capilares y en el cuadro histológico

Alrededor del sexto día el flujo capilar disminuyemientras gradualmente se establece un proceso trombótico que lleva a la necrosis del injerto a su repulsión por los tejidos receptores

Se hicieron observaciones en un segundo grupo de homoinjertos que fueron rechazados mas rapidamente por el recipiente Estas observaciones confirman los fenómenos descritos por Medawar en el conejo y constituyen uno de los argumentos de

que el rechazo del homoinjerto se debe al establecimiento de inmunidad activa en el recipiente

---

Persistent Full Thickness Skin Homograft in a Pregnant Woman. ZVI NEUMAN, M. D *Department of Surgery, Plastic and Maxillo-Facial Service Hadassah University Hospital, Jerusalem, Israel*

It is an accepted fact that if all other factors and conditions are equal homografts persist and live for about the same length of time on males virgins and non-pregnant females Billingham and co-workers[1] thought that the secretion of cortisone-like steroids during pregnancy might in some degree protect the fetus, who is partially a tissue homograft, against the possible danger of immunizing the mother and thus prevent inevitable disaster This idea was further developed by Medawar[2] Valone[3] found a prolonged viability of homografts in pregnant mice.

With these ideas and findings in mind we thought that a human female in her sixth month of pregnancy would be of help in the understanding of this problem.

CASE HISTORY

A young woman 18 years old was admitted into our service on November 9th 1954 with superficial and deep burns on her lower abdomen, upper and lower extremities extending over an area of about 22 per cent of her body surface. The patient was in her sixth month of her first pregnancy Electrolytes and blood were started immediately and the burned areas were cleansed and pressure dressings applied to the extremities The lower abdomen was exposed.

On the 14th day all superficial burns were healed, except some small areas of deep skin loss over her abdomen and right thigh

On December 10th, the eschar was removed and wounds prepared for grafting On December 14th, the patient was covered with split thickness autografts and with full thickness homografts obtained from the inguinal region of a little boy operated for a strangulated hernia. This homograft was divided into several small stamps, which were placed on the right thigh and on the abdomen.

On December 19th five days after grafting all grafts took. Homografts were easily detected by their light pink color and by their thickness (Fig 411 top)

On January 28th 1955 the patient gave birth to a boy

On February 1st, fifty days after grafting, the homograft could easily be seen (Fig 411 center) A biopsy, passing through the junction between autograft and homograft, was obtained, and showed the following findings (Fig 411 bottom)

Autograft The epidermis is of uniform thickness. Immediately under it moderately vascularized scar tissue can be seen. No skin appendages are found There is a slight perivascular infiltration of polymorphonuclear cells, but mainly lymphoid cells and histiocytes

Homograft The epidermis is of uniform thickness but thicker than the autograft. In the dermis there are large collections of mononuclear inflammatory cells and few granulocytes, mainly around hair follicles and sweat glands of which there are many The upper dermis shows much less inflammation. Sections stained by the Weigert method show in the homograft an abundance of elastic fibers mainly within the deeper dermis. These end abruptly in sharp lines at the junction of auto and homograft. The autograft is very poor in elastic fibers all of which are found in the upper dermis.

As the homograft was obtained from a male donor and grafted on a female the skin specimen was studied for sex chromatine.

No sex chromatine was found in the homograft. In the autograft however sex chromatine was found on the basal membrane of some nuclei, but the result was not conclusive probably because the specimen was not fixed according to the modified Davidson method as advocated by Moore and co-workers.[4]

SUMMARY

A persistent full thickness skin homograft was obtained in a pregnant woman.

REFERENCES

1 Billingham, R E, Krohn P L, and Medawar P B Brit. Med J, ii 1049 1951
2 Medawar P B Evolution (Symposia of the Society for Experimental Biology) 7 320 1953.
3 Valone J A Plast. Reconstr Surg, 10 354, 1952
4. Moore K. L., Graham M A and Barr M L. Surg. Gyn. Obst., 96 641 1953

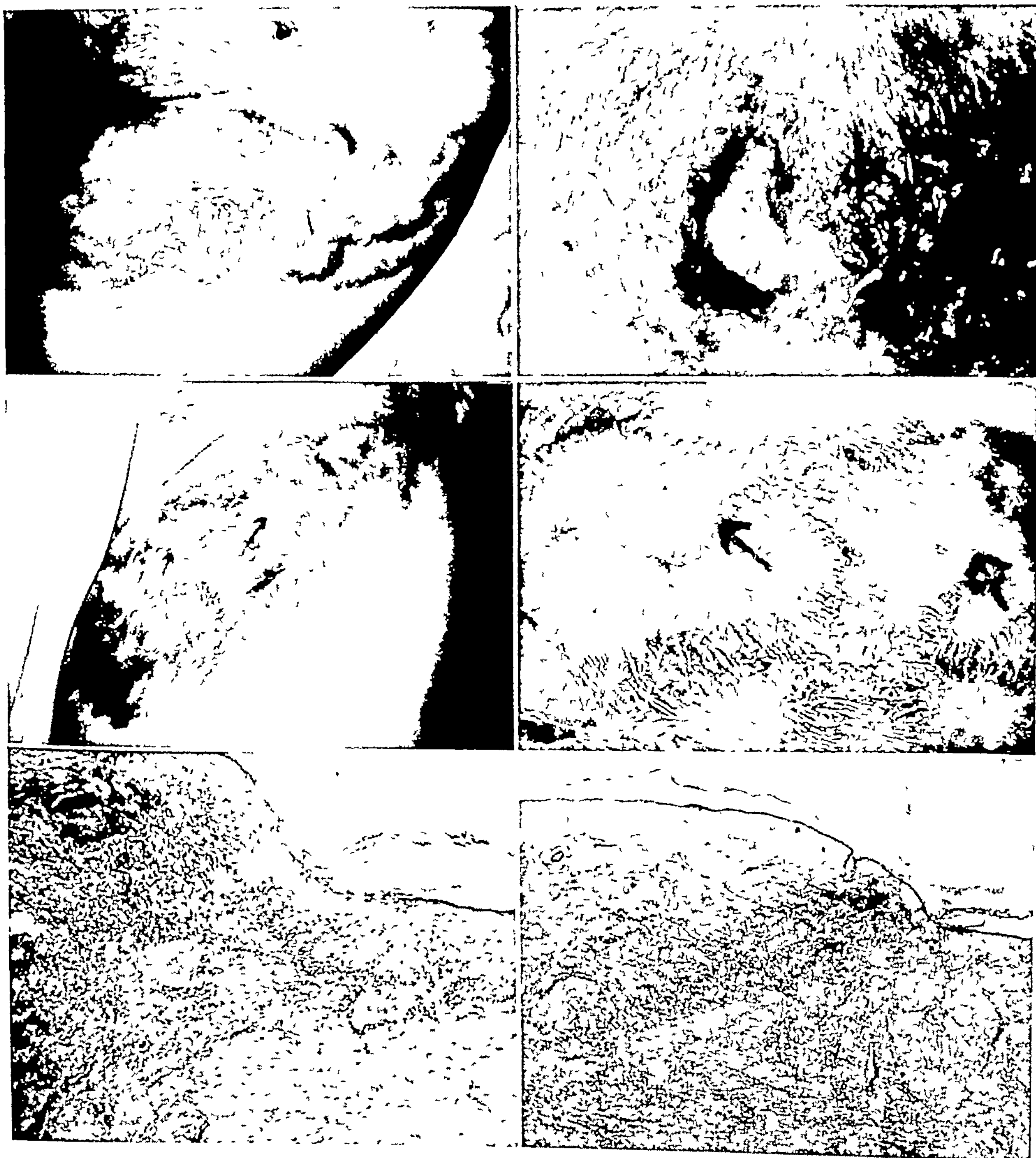


FIG 411 (top left) Five full-thickness homografts on the thigh Two weeks after grafting (Top right) One full-thickness homograft on the abdomen (Center left) Thigh with homografts fifty days after grafting (Center right) Same enlarged view (Bottom left) Junction of homo and autograft Fifty days after grafting (× 33) (Bottom right) Junction of both homo and autograft

Persistance d'une Homogreffe de Peau Totale Chez une Femme Enceinte. ZVI NEUMAN

La persistance d une homogreffe de peau totale a pu être obtenue chez une femme enceinte

La malade une jeune femme enceinte de 6 mois avait été la victime d une brûlure des membres et de l abdomen intéressant 22 à 25% de la surface corporelle Ces zones furent préparées et greffées. On utilisa chez cette malade aussi bien des autogreffes que des homogreffes de pleine peau ces dernières provenant d un jeune garçon opéré pour hernie inguinale Toutes les greffes prirent.

45 jours après la greffe la malade accoucha. 50 jours après la greffe on pratiqua une biopsie tant de l autogreffe que de l'homogreffe et il fut possible de distinguer les deux types de peau

80 jours après la greffe les homogreffes étaient encore en excellente condition

L auteur continue son expérimentation tant sur des animaux gravides que sur des femmes enceintes.

Ein Überdauerndes Vollhauthomotransplantat bei einer Schwangeren Frau. ZVI NEUMAN

Ein überdauerndes Vollhauthomotransplantat wurde bei einer schwangeren Frau erzielt.

Die Patientin eine junge Frau im 6 Schwangerschaftsmonat, erlitt eine 22 25%ige Verbrennung der Gliedmassen und des Abdomen Diese Bezirke wurden vorbereitet und durch Transplantation gedeckt Sowohl Autotransplantate als auch Homotransplantate von voller Dicke wurden angewandt. Die Homotransplantate wurden von einem kleinen Jungen genommen, der wegen Inguinalhernie operiert wurde. Alle Transplantate heilten an.

Fünfundvierzig Tage nach der Transplantation gebar die Patientin einen Jungen Fünfzig Tage nach der Transplantation wurde eine Probeexzision aus dem Autotransplantat und dem Homotransplantat entnommen beide Arten von Haut konnten deutlich unterschieden werden Achtzig Tage nach der Transplantation waren die Homotransplantate immer noch in ausgezeichnetem Zustand.

Weitere Experimente an schwangeren Tieren und Frauen sind im Gange

Persistencia de un Homoinjerto de Todo Espesor enuna Mujer Embarazada. ZVI NEUMAN

En una paciente joven sexto mes de embarazo se presentó una quemadura de extremidades y abdómen de 22 a 25% de extensión Estas areas fueron preparadas o injertadas con autoinjertos y homoinjertos Los homoinjertos se obtuvieron de un niño operado de hernia inguinal Todos los injertos prendieron

Cuarenta y cinco días después de la operación de injerto la paciente tuvo a su hijo Cincuenta días después del injerto una biopsia conteniendo el auto y el homo-injerto fue obtenida y en el exámen microscópico se reconocieron claramente ambos tipos de piel

Ochenta días después del injerto los injertos homólogos se encontraban aun en condición excelente Se continua haciendo trabajo experimental en animales y mujeres embarazadas.

The Use of Skin Homografts to Differentiate between Monozygotic and Dizygotic Human Twins.

BLAIR OAKLEY ROGERS, M D *Department of Plastic Surgery, St Barnabas Hospital, Newark, New Jersey* Lyndon A Peer M D, *Director*

INTRODUCTION

In 1927 K H Bauer of Heidelberg[1] reviewed the theoretical concepts of homografting that existed during the twenties. Agreeing with his predecessors Borst and Enderlen,[2] Lexer[3, 4] Perthes[5] and Eden,[6] that the lack of permanent survival of homografts was caused by a hereditary or genetic difference between donor and host he postulated that homografting would be successful therefore and similar to autografting if donor and host were genetically equal"

Only in identical twins could a genetic equality" satisfy the requirements for his hypothesis Non identical twins are no more closely related than are ordinary full brothers and sisters![7] He had the opportunity to operate upon a pair of identical twins whose genetic similarity was established by examination of blood groups and a close resemblance of physical characteristics Both twins were born with the same form of syndactyly involving the fourth and fifth fingers of both hands Bauer transplanted a piece of skin 1.2 x 5 cm in size from one twin to the defect created on the fourth finger during the syndactyly repair of the other twin This homograft healed by primary intention and survived permanently differing in no way from an ordinary autograft Bauer had thus established for the first time that skin homografting could serve as a test for identical twinning

In subsequent years a number of clinicians[8–18] repeated Bauer s observations with the same results McIndoo and Franceschetti[9] summarized these reports and, at the same time described the use of skin homografts in a remarkably simple yet ingenious method to iden-

tify two identical twins out of three children who had apparently been inadvertently exchanged soon after birth in the hospital nursery where all three children had been born They describe this medico-legal problem in the following interesting excerpt "In 1947 the parents of 6-year-old twins (Victor and Pierre J) became aware of the existence of another small boy (Eric V) who presented a striking resemblance to one of their own children Believing first that it was simple coincidence, they were surprised to learn that the other child was born the same night, and in the same clinic as their own During a parade in which the similarly dressed children were participating, the father was shocked by the resemblance and decided to contact the authorities in order to learn whether or not a substitution of one of his twins could have taken place " Full-thickness skin homografts transplanted between the two boys who had been raised together as twin brothers necrosed and sloughed off, whereas skin homografts between Victor and Eric, the true twins, survived permanently "This story, unique both from the scientific and emotional point of view, had an interesting epilogue in accordance with the conclusions of the investigation, the authorities ordered the exchange of the substituted children The adaptation of the children to their new environment is, as personal inquiries have confirmed, satisfactory " [12]

Interestingly, to date there have been no apparent reports in the medical literature on the behaviour of skin homografts in non-identical twins Employing Bauer's reasoning, and the statement of fact by Billingham *et al* [7] that non-identical or two-egg twins are genetically related to each other only as ordinary brothers and sisters, it occurred to me that skin homografts reciprocally transplanted between non-identical twins, therefore, would eventually be rejected and sloughed as they invariably are when transplanted between ordinary brothers and sisters It should be mentioned here, however, that contrary to other clinicians,[8–13] Meyer-Burgdorff [14] described the rejection of skin homografts in a pair of twins whom he regarded as "identical" (monozygotic), but the exact methods of diagnosing this monozygosity were not listed in his brief text, and it seems probable that these twins were actually non-identical (dizygotic)

Recently the opportunity arose to reciprocally transplant skin homografts in two sets of twins whose genetic identity had not been conclusively established The results obtained were taken as evidence that non-identical or dizygotic twins reject skin homografts reciprocally transplanted between them, thus contrasting with identical twins who accept each other's skin homografts permanently without any signs of rejection and sloughing

Before describing these two cases and an additional case in detail, it would seem advisable at this point to briefly outline the routine methods used by the author and his colleagues in transplanting full-thickness skin homografts to human volunteers

I Methods

By employing a cork stopper or a metallic ring whose circumferential edge is painted with methylene blue, it is possible to imprint a uniform circle on the skin, which thus serves as an outline of the graft to be excised Full-thickness, circular skin homografts of identical size are thereby taken from and transplanted to the anterior thigh, volar forearm, or medial arm surfaces of human volunteers, depending upon their aesthetic preferences * All visible subcutaneous fat is gently and carefully trimmed away from the dermal under-surface of the graft by means of a small, straight plastic scissors

Since the graft and the skin defect created by its removal are identical in size, all homografts transplanted by this method are "fitted" grafts Many interrupted, 5-0 black silk, bolus sutures are used to sew the graft into position Each homograft is then dressed with vaseline, xeroform, or fine-mesh nylon gauze, and the bolus is constructed of lamb's wool soaked in mineral oil, or absorbent cotton soaked in normal saline Bulky, fluffed, dry sterile gauze, and elastic bandages amply reinforced with adhesive tape, are then applied to firmly immobilize the homografted area

---

* This technique was developed by the author in collaboration with Dr John M Converse, at the Plastic Surgery Unit, Department of Surgery, New York University College of Medicine, New York, New York The photographs in Figures 412-415 were taken at the Plastic Surgery Unit when the author was Milbank Fellow in Plastic Surgery (1951-1952)

All skin homografts were examined for the first time on the fifth postoperative day Bulky compressive dressings were then reapplied and continued until the ninth or tenth postoperative day when sutures were removed. Dressings were changed and the graft examined every 2 days following the first change of dressing on the fifth postoperative day In some human volunteers, serial punch-biopsies were removed from the host-graft junction every 3-5 days for microscopic study by use of a hand-operated Reese biopsy trephine under a 2 per cent local procaine anesthesia Using a clockwise counter clockwise cutting motion this trephine is employed much in the same manner as a simple cookie-cutter

The usual behaviour of a full thickness skin homograft transplanted between ordinary non-related individuals can be observed in the process of an "initial take" on the fifth postoperative day and its gradual rejection on subsequent days in Figures 412-414 The "initial take" is shown in Fig 412 A. The onset of vascular thromboses hemorrhage and extravasation in the graft dermis (the first signs of a homograft "rejection" reaction) are seen in Fig 412, B Sloughing of the superficial epithelium with exposure of raw graft dermis lying underneath can be noted in Fig 412, C. The first appearance of "dry" necrosis or gangrene of the denuded graft dermis is observed in Fig 412, D on the postoperative day This is even more apparent in Fig 412, E on the 19th postoperative day On the 21st postoperative day (Fig 412, F) the entire "dermal pad" is gangrenous In the photographs taken on the 26th postoperative day (Fig 413 A) to the 51st postoperative day (Fig 414 A) a gradual disintegration absorption, and sloughing of the remaining graft dermis can be noted. Within this same time period a gradual contraction of the wound edges of the full-thickness defect, which eventually results in closure of the wound by a union or apposition of its original edges is evident. Billingham and Medawar[15] noted this same type of contracture and intussusceptive growth in the healing of full thickness defects in rabbits. In Fig. 414 B on the 54th postoperative day the last vestiges of "dermal pad" have finally disappeared and epithelization from the edges of the defect is almost complete.

The usual behaviour cycle of a full-thickness skin-homograft transplanted between ordinary non-related individuals has thus run its course from the "initial take" (Fig. 412 A) to the "dermal pad" (Fig. 412 D-Fig 414 A) and finally to complete disintegration and disappearance (Fig. 414, B)

Using this grafting technique, in human volunteers, we were able to verify Medawar's observations[16] in rabbits that a second skin homograft taken from the same donor and transplanted to the same host undergoes a more rapid rejection and disintegration (the "second-set" phenomenon) This is conclusively demonstrated in Fig. 415 A-Fig 415 D The "first-set" graft on the 9th postoperative day (Fig. 415 A) is still two-thirds grossly normal in appearance, uninvolved by the hemorrhage which occupies the other one-third of the graft surface whereas the "second-set" graft (Fig 415 B) on the 10th postoperative day is markedly hemorrhagic and already gangrenous Figures 415 C and D photographs of the first and second-set grafts respectively taken on the 12th postoperative day are the most dramatic in demonstrating a more rapid rejection of second-set grafts taken from the same donor and applied to the same host on the opposite thigh or arm, (thus emphasizing the "systemic" nature of the homograft rejection phenomenon)

The small, round punched-out areas seen in the photographs at the host-graft junction are areas from which biopsies were taken with the Reese trephine We feel that this biopsy technique does not disturb the graft itself as it does not create any motion of the graft on the bed to which it has been applied. By the time the first biopsy specimen is taken on the 5th postoperative day the graft is usually firmly anchored to its host bed by the healing processes involved in the "initial take."

With Figures 412-415 serving as a reference background to the usual behaviour of full-thickness skin homografts in humans the practical use of skin homografts in studies of hereditary and acquired or environmental abnormalities now assumes a clearer and more obvious perspective.

II. Case Reports

Dr Franz J Kallmann[17] states in his extremely interesting book, *"Heredity In Health*

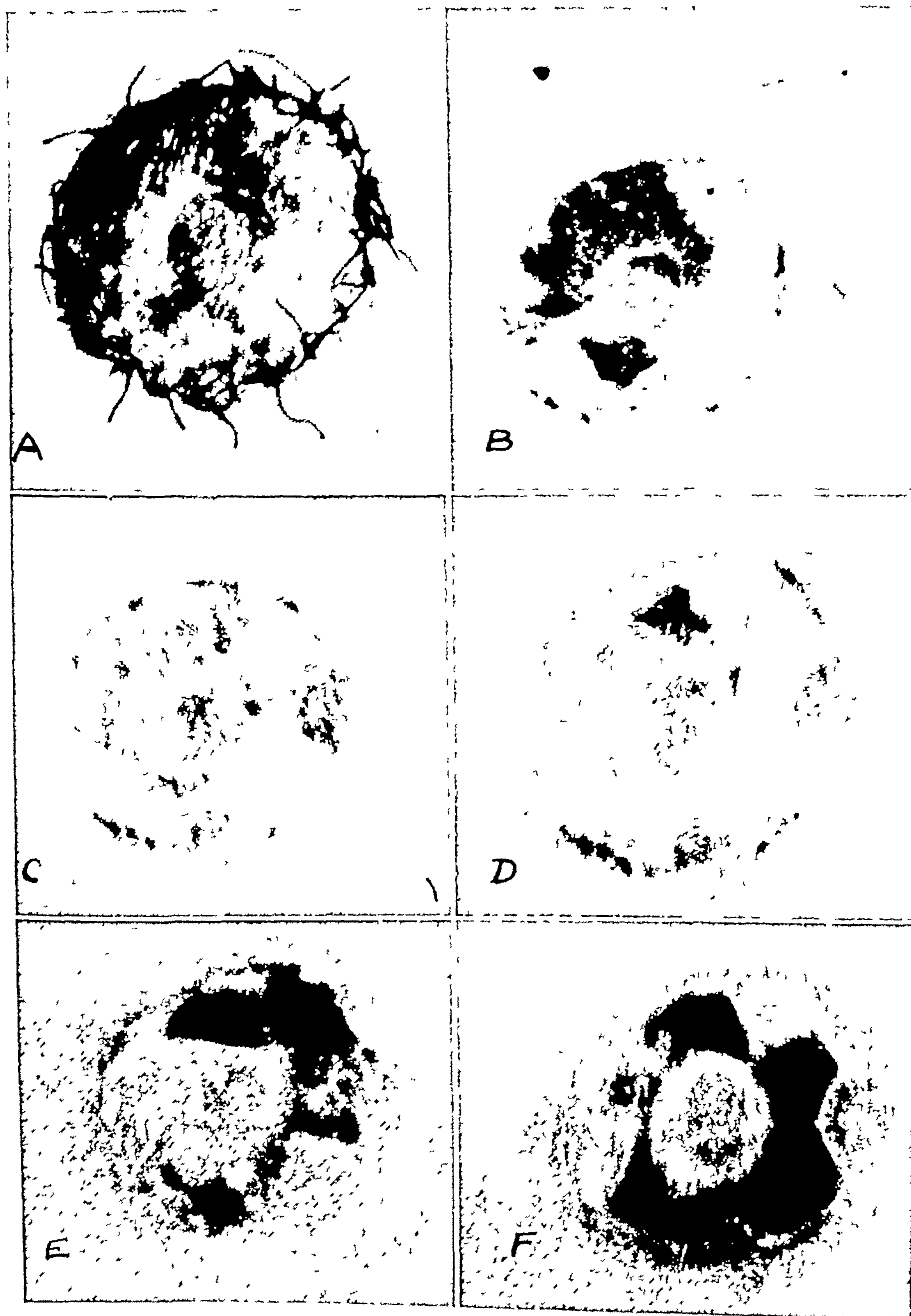


FIG 412 Behaviour of full-thickness skin homograft A 5th post-op day B 9th Post-op day C 12th post-op day D 14th post-op day E 19th post-op day F 21st post-op day

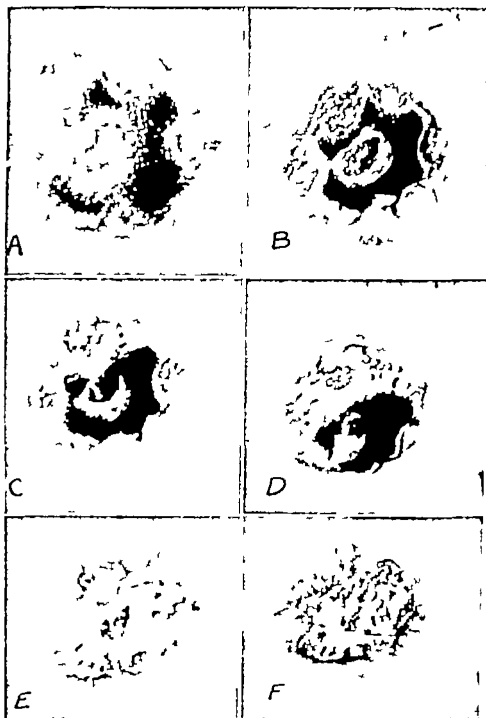


FIG. 413 Behaviour of full-thickness skin homograft (contd.) A 26th post-op day B 32nd post-op day C 34th post-op day D 38th post-op day E 41st post-op day F 48th post-op day

And Mental Disorder." "The phenomenon of twinning does supply the human sciences with many valuable sets of genotypically identical individuals whose dissimilarities can be compared with the behavioural variations observed in ordinary sibs or two-egg twins Over one and a half million pairs of twins are available in the United States for scientific studies one-quarter to one-third of this number being of the one-egg (monozygotic) variety "

Certain mental deficiencies such as mongolism, have interested geneticists and psychologists alike especially because the etiology of these disorders is obscure When therefore a situation arises in which a pair of twins is characterized by one normal twin and one mongoloid twin (see Figure 416) the accurate diagnostic differentiation between monozygosity and dizygosity in these twins becomes a matter of great importance to these research workers If the

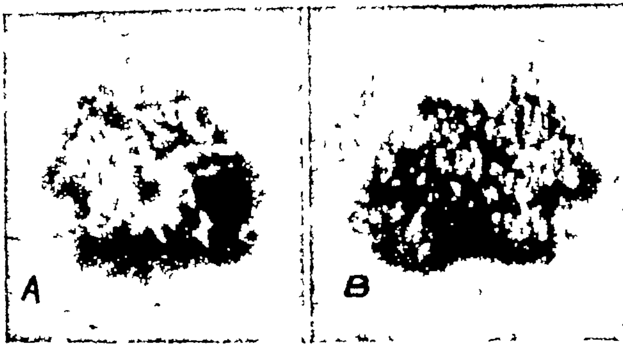


FIG 414 Behaviour of full-thickness skin homograft (contd) A 51st post-op day B 54th post-op day

mongoloid child proves to be an identical twin, the mere existence of the physical and mental normalcy of his twin brother helps to discredit or make less valid the theory of hereditary mongolism, and, in turn, adds more weight to the influence of acquired or environmental etiologic factors in the development of mongolism, especially in this particular child These same findings could apply equally as well to the role of hereditary versus acquired or environmental etiologic factors in the development of a harelip



FIG 416 Case I—Non-identical twins Normal twin on the left, mongoloid twin on the right

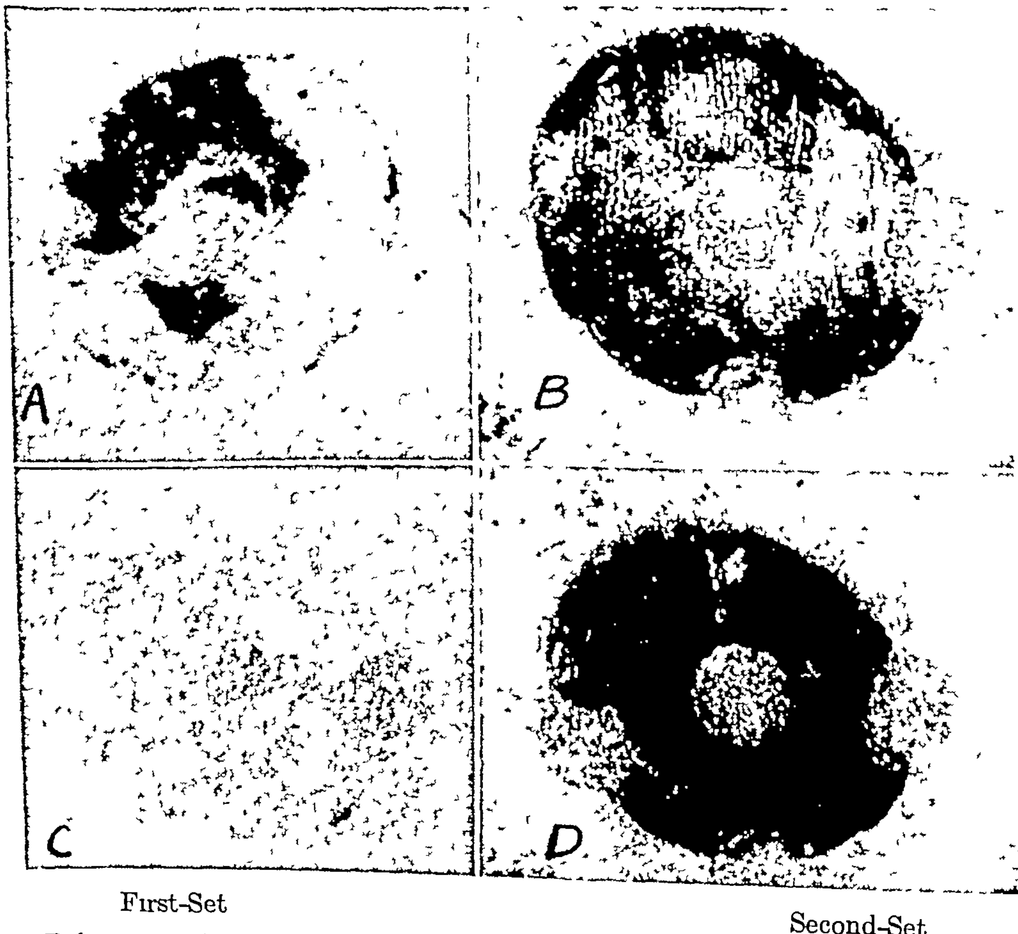


FIG 415 Behaviour of "First-set" and "Second-set" full-thickness skin homografts A 9th post-op day B 10th post-op day C 12th post-op day D 12th post-op day

or cleft palate in one of two proven "identical twins.

In cases I and II, the zygosity of two pairs of twins could not be completely or conclusively determined by the usual comparative genetic tests and criteria. This quandary presented certain difficulties to the geneticists and psychiatrists who were studying mental deficiencies in twins.* As a last resort the present skin-homografting procedures were performed in the hope of determining the zygosity of these two pairs of twins. Since to date, all reciprocal skin homografts in human identical twins have behaved like autografts[4-13] and survived permanently (with the exception of Meyer Burgdorff's doubtful case)[14] the permanent survival of homografts in either of these two sets of twins would at least serve to diagnose "monozygosity."[15]

Both pairs of twins had identical blood antigens and very similar dermatoglyphic patterns. Blood of all four twins was examined at the Knickerbocker Foundation Inc., New York City for heterogeneity of the red blood cells in respect to the ABO antigens, with negative results. Since in each case one twin was severely defective, both mentally and physically ordinary morphological criteria of zygosity could not be relied upon.

In one set of twins, 11 year-old boys the defective member was a mongoloid imbecile (see Figure 416) the mongoloid had a moderate amount of brown (superficial) eye pigmentation that was lacking in his brother. The other set of twins were 13-year-old girls of whom the defective member had microcephaly of post natal origin retrolental fibroplasia and a symmetrical growth anomaly of the toes (see Figure 417).

* The study of Cases I and II reported in this paper was part of a study of mental deficiency in twins now in progress at the Department of Medical Genetics of the New York State Psychiatric Institute. The larger project is under the joint supervision of Dr Franz J Kallmann and the Laboratory of Socio-environmental Studies Research Branch, National Institute of Mental Health Public Health Service. The homo graftings in Cases I and II were performed in Dr Kallmann's Department of Medical Genetics at the N Y State Psychiatric Institute. Clinical studies and preliminary tests of zygosity were carried out by Dr Gordon Allen of the National Institutes of Health and blood group studies were made by Dr Philip Levine of the Ortho Research Foundation, Raritan, New Jersey



FIG. 417 Case II.—Identical twins. A. Normal twin. B Defective twin. C Normal twin. D Defective twin. E. Symmetrical growth anomaly in 4th and 5th toes of defective twin.

In both cases full thickness circular skin homografts were reciprocally transplanted in corresponding defects made on the volar surface of the left forearms of each of the two sets of twins. The normal "initial take" of these grafts can be observed in Figure 418 A and B photographs taken on the 7th postoperative day. Between the 19th postoperative day (see Fig. 418 C) and the 22nd postoperative day (see Fig 419 A) in the twin brothers (Case I) a sudden violent rejection of the skin homografts occurred. This was evidenced by redness and induration on the 19th postoperative day and by marked induration, redness vascular thromboses, hemorrhage, and ulceration on the 22nd

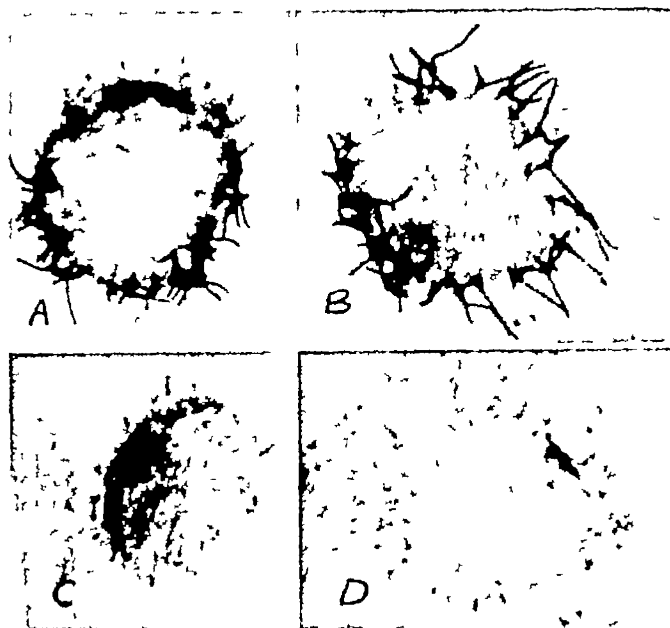
postoperative day The grafts became gangrenous rapidly, and the entire full-thickness of skin in both twins was promptly sloughed off, leaving behind a small defect (see Fig 419, C) which, at the ninth week after transplantation was healed by a moderate amount of scar tissue and epithelization from the wound edges

In the twin girls, however, the homografts on the 19th postoperative day (see Fig 418, D), the 22nd postoperative day (see Fig 419, B), and nine weeks after transplantation (see Fig 419, D) survived, and behaved in every respect like autografts This survival indicated a monozygotic relationship in the twin girls Except for the relatively delayed "rejection phenomenon" in the boys, however, the phenomena observed were identical to those associated with the sloughing of skin homografts between two unrelated individuals [19] This result was taken as evidence that the twin brothers in Case I were dizygotic in origin

An additional case afforded the opportunity of transplanting reciprocal skin homografts between two little twin girls, one of whom had a cleft palate and fusion deformities of her cervical vertebrae (see Figure 420) * Their mother was convinced that these children were non-identical Skin homografting was employed, not only to help the mother settle in her own mind the zygosity of her twins, but also to show that it is a feasible procedure to use in studying the role of hereditary versus acquired or environmental etiologic factors in the development of harelip and cleft palate Photographs of the homografts transplanted to the medial surface of each child's arm, taken on the 28th postoperative day, reveal the normal appearance of these grafts (see Figure 420, B and C) In the several subsequent months that have passed since the transplantation, these grafts have continued to survive and show no signs of sloughing We have taken this as conclusive evidence that these girls are identical twins, and concluded from this case that acquired or environmental factors played a major role in the development of cleft palate in one of these twins

* This case was obtained through the kind efforts of Dr John C Walker, St Barnabas Hospital, Newark, New Jersey, who also served as co-surgeon in the reciprocal transplantation procedure

Non-Identical Twins (Case I)



Identical Twins (Case II)

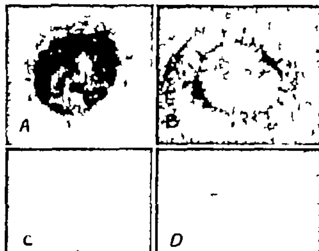
FIG 418 Behaviour of full-thickness skin homografts in non-identical and identical twins A 7th post-op day—"Initial take" B 7th post-op day—"Initial take" C 19th post-op day Onset of induration and redness D 19th post-op day Continued survival

III Discussion

In interpreting the results obtained in these three cases, the error of "circular reasoning" is an easy one to make That is, if one assumes from the rejection of skin homografts in Case I that the twins in this case are non-identical, it would seem that the natural corollary to this statement should be—non-identical twins reject each other's skin homografts It is still too early, however, to make this definite statement, the author is hoping that the opportunity will soon arise to transplant reciprocal skin homografts between two dizygotic human twins whose zygosity is already proven by usually reliable genetic criteria If these twins also reject their transplanted skin homografts, it would seem fairly obvious in light of the permanent survival or acceptance of homografts in monozygotic twins,[8–18] that the rejection of reciprocal skin homografts can be used as a conclusive test for dizygosity when other standard genetic criteria fail

A precedent already exists for these observations in lower animals Skin homografts exchanged between dizygotic twin sheep [20] or ordinary cattle siblings [21] are rejected, this is

Non-Identical Twins (Case I)



Identical Twins (Case II)

Fig 419 Behaviour of full thickness skin homografts in non-identical and identical twins (contd) A 22nd post-op day Rejection reaction hemorrhage ulceration B 22nd post-op day Continued survival C Nine weeks post-op Homograft sloughed scar defect. D Nine weeks post-op Continued survival normal graft

in contrast however to the fact that skin homografts between some dizygotic twin cattle frequently survive indefinitely [21] These dizygotic twin cattle, on the other hand represent a distinct genetic entity not generally encountered in humans or sheep this is the condition known as freemartin twinning The contrast between cattle and sheep in this respect has been attributed [21-23] to the interchange of fetal blood in cattle twins as evidenced by the occurrence of freemartins in cattle Furthermore each member of a dizygotic twin pair of cattle usually has two types of red blood cells [23] a heterogeneity suggestive of an actual transplantation of blood forming tissues by way of the fetal or vascular anastomoses Anderson *et al* [21] suggest " that the anomalous tolerance of dizygotic cattle twins to grafts of each other's skin has the same origin as their conformity of immunological blood types " Such animals are spoken of as erythrocyte chimeras At least one such chimera has been described in man [24]

If further skin homograftings in dizygotic human twins demonstrate, as is strongly suggested by Case I that dizygotic twins reject reciprocal skin homografts then skin interchange can be used as a highly accurate test for monozygotic and dizygotic twinning in humans

A further test to make doubly certain that monozygosity was proven by skin homografting would consist of applying "second-set" grafts from the same donor to his identical twin. Theoretically these should be accepted equally as well as the first-set " whereas a "second-set in dizygotic twins or ordinary non related individuals should be rejected more rapidly This would be of importance to research workers especially geneticists who use the twinning condition to study the role of hereditary versus acquired or environmental etiologic factors in the development of physical and mental abnormalities and deficiencies [17 25]



Fig 420 Case III—Identical twins. A Normal twin (left)—(J.B) Cleft-palate twin (right)—(M.B) B 28th post-op day Continued survival of reciprocal full-thickness skin homograft—(J.B) C 28th post-op day Continued survival of reciprocal full-thickness skin homograft—(M.B)

There are those who might question the advisability of resorting to skin homografting when blood grouping or fingerprinting, etc can be performed more easily It should be remembered, however, that wide differences in fingerprints can occur in monozygotic twins,[26] and that recent studies by Osborne[27] have shown that among same-sex twins having the same blood factors, about 15-18 per cent may be dizygotic This finding reduces the absolute certainty of using identical blood groups only as a test for monozygosity In his 1955 Ph D thesis at Columbia University, entitled *"Hereditary and Environmental Factors in Body Build A Study of 100 Pairs of Adult Twins,"* Osborne finally diagnosed 34 same-sex pairs as dizygotic Among these, 6 or 18 per cent showed no differences with respect to reliable blood group factors including ABO, RH (5 factors), MNS, Kell, Duffy, and others Allen[26] emphasizes that fingerprints, anthropologic measurements, etc will give rather good genetic evidence for identifying the dizygosity of some of these 15-18 per cent of dizygotic twins with identical blood group factors, "but there is bound to be a residue that can be recognized only by skin homografting"

Fogh-Andersen[25] suggests that certain etiologic conclusions can be drawn from a "large unselected series of twins with harelip or cleft palate" The author recommends that these conclusions can probably be made even more valid if the exact zygosity is proven by skin homografting in those twins in whom any doubt, whatsoever, exists about the accurate diagnosis of monozygosity or dizygosity After emphasizing that conclusions could be drawn "that a hereditary disposition must be of importance for the development of the affection,"[25] if the frequency of monozygotic twins, both of whom share a cleft palate abnormality, is statistically greater than among dizygotic twins, Fogh-Andersen analyzed 131 pairs of such twins, partly obtained from his own case material and partly from the literature The incidence of harelip plus cleft palate in any single child in this group was distinctly greater in monozygotic twins than among dizygotic twins, among whom the frequency was almost the same as among other siblings, "thus bearing out the assumption that hereditary factors are of considerable importance etiologically"[25]

Kemp[28] suggests that the most likely method of inheriting these disorders is " that of conditioned dominance with sex limitation to males and considerably less manifestation of the heterozygous than of the homozygous form" Kallmann[17] concludes "The resultant family distribution of the defect appears dominant in some instances and recessive in others The approximate incidence in the general population is 1 5 1,000, *but 44 1,000 in the subsequent children of two normal parents with one malformed child*"

IV Summary

1 Full-thickness skin homografts, reciprocally transplanted, survive permanently in identical (monozygotic, one-egg) human twins

2 One case of reciprocal full-thickness skin homografting in twins, reported in this paper, suggests that such homografts are rejected by non-identical (dizygotic, two-egg) human twins, much in the same manner as they are rejected when transplanted between ordinary brothers and sisters

3 If additional studies of the behaviour of full-thickness skin homografts reciprocally transplanted in proven dizygotic human twins demonstrate that these twins always reject each other's homografts, the conclusion can be drawn that skin homografting can be used as a highly accurate test for monozygosity and dizygosity in human twins

4 Skin homografting is a feasible procedure in clarifying the role of hereditary and acquired etiologic factors in the development of mental and physical abnormalities

Acknowledgments

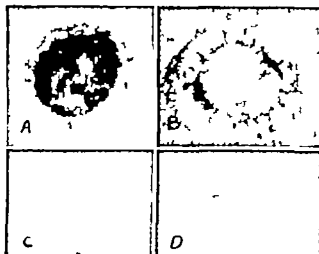
The author wishes to thank Dr John M Converse for his stimulating criticism and invaluable help in the course of these investigations, Dr John C Walker for his generous efforts in obtaining a case of twins used in this report, and Dr Gordon Allen, whose many accurate and penetrating suggestions have served to immeasurably increase the author's respect for the wide practical scope of medical genetics

References

1 Bauer, K H Beitr z klin Chir, 141 442, 1927

2 Borst and Enderlen Deutsch Ztschr f Chir, 99 54, 1909

Non Identical Twins (Case I)



Identical Twins (Case II)

Fig 419 Behaviour of full thickness skin homografts in non-identical and identical twins (contd) A 22nd post-op day Rejection reaction hemorrhage ulceration. B 22nd post-op day Continued survival C Nine weeks post-op Homograft sloughed scar defect D Nine weeks post-op Continued survival normal graft

in contrast however to the fact that skin homografts between some dizygotic twin cattle frequently survive indefinitely [21] These dizygotic twin cattle on the other hand, represent a distinct genetic entity not generally encountered in humans or sheep this is the condition known as freemartin twinning The contrast between cattle and sheep in this respect has been attributed [21-22] to the interchange of fetal blood in cattle twins as evidenced by the occurrence of freemartins in cattle Furthermore each member of a dizygotic twin pair of cattle usually has two types of red blood cells [23] a heterogeneity suggestive of an actual transplantation of blood forming tissues by way of the fetal or vascular anastomoses Anderson *et al* [21] suggest " that the anomalous tolerance of dizygotic cattle twins to grafts of each other's skin has the same origin as their conformity of immunological blood types Such animals are spoken of as erythrocyte chimeras At least one such chimera has been described in man [24]

If further skin homograftings in dizygotic human twins demonstrate as is strongly suggested by Case I that dizygotic twins reject reciprocal skin homografts then skin interchange can be used as a highly accurate test for monozygotic and dizygotic twinning in humans.

A further test to make doubly certain that monozygosity was proven by skin homografting would consist of applying "second-set" grafts from the same donor to his identical twin. Theoretically these should be accepted equally as well as the "first-set whereas a second-set" in dizygotic twins or ordinary non related individuals should be rejected more rapidly This would be of importance to research workers, especially geneticists who use the twinning condition to study the role of hereditary versus acquired or environmental etiologic factors in the development of physical and mental abnormalities and deficiencies [17 25]



Fig. 420 Case III—Identical twins. A Normal twin (left)—(J.B) Cleft-palate twin (right)—(M.B) B 28th post-op day Continued survival of reciprocal full-thickness skin homograft—(J.B.) C 28th post-op day Continued survival of reciprocal full-thickness skin homograft—(M.B.)

zaron homoinjertos, con lo cual se estableció el orígen monozigótico por la sobrevida permanente de homoinjertos transplantados de una manera cruzada

En otro grupo los homoinjertos fueron rechazados entre el 19 y 22avo día, lo cual fue tomado como evidencia de dizigoticidad

El autor refiere el método como una posible prueba para determinar la monozigoticidad y dizigoticidad en estudios genéticos referentes a la etiologia y anormalidades hereditarias y congénitamente adquiridas o en la solución de problemas médico-legales

---

Histograms and Ashegrams of Skin Homografts after Eight Years.

FRANCESCO FIRINU, M D, *Viale Trieste 2, Cagliari, Italy*

At the National Congress of Plastic Surgery held in Rome on October 15th, 1953, I reported a case of human homograft which had taken The graft measured approximately 30 square cm, it was performed on February 19th, 1948, and thus having a six-year follow-up

On trying to explain the reason for the take I have assumed the hypotheses that it was due to the quality and quantity of hormones in circulation because the subject was 8 months pregnant

Because of the excellent co-operation of the patient, I am able to explain all the researches I have done

At this time I thought that the histological phenomena which follow the transplantation were (1) the plasmatic phase, (2) the phase of vascularization, (3) the organic fusion, (4) the innervation, and now I have to add a 5th phase, the one of stabilization

Fig 421 shows the starting point the area from which the graft was taken and the leg with the taken graft well evident

a The intact skin of the arm of the male donor

b The graft which has taken

c The intact skin of the leg of the female recipient

The histological technique is as follows

1 Local anesthesia with 2½ novocain

2 Biopsy

3 Specimen fixed in 75° alcohol



FIG 421

4 Staining with hematoxylin and eosin

5 The ashing done in a common oven at 300°C

The histological picture

Fig 422, A Skin of the arm of the male donor, it is possible to see the type of dermis made up of large fibrous strands, rich in sebaceous and sweat glands, hair follicles and sections of hairs

Fig 422, B This picture is confronted with the histological aspect of the skin of the leg of the female which shows the dermis with a more delicate fibrous strand and the cutaneous appendages are represented exclusively by few sweat glands No sebaceous glands are seen

Fig 422, C shows the graft which has taken and well maintained for the past 6 years It is possible to see the same type of dermis made up of larger fibrous strands, many sebaceous glands, sweat glands, hair follicles and sections of hairs, in other words the same histological picture of the skin of the arm of the donor

The epidermis does not present considerable changes except a more marked pigmentation of the basal cells in the graft of the arm of the male

In summarizing the skin of the graft maintains the same histological structure and so conserving the structural characteristics which were present at the time of the biopsy

Let us observe now the result with the ashegrams

3 Lexer E. Arch. f klin Chir., 95 827 1911
4 Lexer E. *Die freien Transplantationen*. Verlag von Ferdinand Enke Stuttgart, Volume I 1919
5 Perthes, G Zentralbl. f Chir 44 426 1917
6. Eden R. Deutsch med Wchnschr., 48 85 1922.
7 Billingham R. E., Lampkin G H Medawar P B and Williams H I I Heredity 6 201 1952.
8 Padgett, E. C South Med J 25.895 1932
9 Brown, J B Surgery 1 558 1937
10 Schattner A Arch. Otolaryngol., 39 521 1944.
11 Converse J M., and Duchet G Plastic & Reconstr Surg., 2 342 1947
12 McIndoe A., and Franceschetti A Brit. J Plastic Surg., 2 283 1950
13 Blandford S E Jr., and Garcia F A Plastic & Reconstr Surg., 11 31 1953
14. Meyer Burgdorff Zentralbl f Chir., 58 1357 1931
15 Billingham R E and Medawar P B J Anat., 89 114 1955
16 Medawar P B J Anat., 78 176 1944
17 Kallmann, F J *Heredity In Health and Mental Disorder* W W Norton, New York, 1953.
18. Rogers B O., and Allen G Transplantation Bull., 2 100 1955
19 Rogers, B O Plastic & Reconstr Surg., 7 169 1951
20 Lampkin G H Nature 121-975 1953
21 Anderson, D., Billingham R. E., Lampkin G H and Medawar P B Heredity 5 379 1951
22. Billingham R. E., Lampkin G H., Medawar P B., and Williams, H. Ll Heredity 6.201 1952
23 Owen R D Science 102 400 1945
24. Dunsford I., Bowley C C., Hutchison, A. M., Thompson J S Sanger R and Race R. R Brit. Med J II 81 1953.
25 Fogh Andersen, P *Inheritance of Harelip And Cleft Palate* Nyt Nordisk Forlag, Arnold Busck, Copenhagen 1942
26 Allen, G Personal communications
27 Osborne, R. *Heredity and Environmental Factors In Body Build A Study Of 100 Pairs Of Adult Twins* Thesis, Columbia University New York 1955
28 Kemp T *Genetics And Disease* Munksgaard Copenhagen 1951

L'Emploi d'Homogreffes Cutanées pour Differencier les Jumeaux Humains Monozygotes et Heterozygotes. Blair O Rogers.

Les homogreffes cutanées transplantées réciproquement entre des jumeaux monozygotes survivent de façon permanente Leur comportement chez des jumeaux hétérozygotes n a pas été décrit à ce jour Dans deux groupes de jumeaux faisant l objet de cette étude il n'a pas été possible d'établir le monozygotisme ou l'hétérozygotisme et cela malgré de nombreux tests génétiques. On a donc utilisé l'homogreffe cutanée pour tirer la question au clair Il a été possible dans un couple de jumeaux d affirmer le monozygotisme par suite de la survie permanente de leurs homogreffes en transplantation croisée

Dans le second couple les homogreffes cutanées ont été expulsées entre le 19e et le 22e jour après l opération. Cela est considéré comme un signe d'hétérozygotisme car une lyse d'homogreffes réciproquement transplantées n a jamais pu être notée chez des jumeaux monozygotes génétiquement prouvés. Il semble donc que les homogreffes cutanées constituent un procédé clinique qui permet le diagnostic clinique du monozygotisme ou de l'hétérozygotisme dans les études génétiques visant à déterminer l étiologie des malformations héréditaires ou congénitalement acquises son emploi peut être également utile pour résoudre certains problémes médicolégaux.

Der Gebrauch von Homotransplantaten zur Unterscheidung ein- und zwei-eiiger Zwillinge Blair O Rogers.

Hauthomotransplantate die gegenseitig auf eineiige Zwillinge überpflanzt werden, überleben dauernd. Über ihr Verhalten bei zweieigen Zwillingen ist bisher nicht berichtet worden. Bei zwei Zwillingspaaren dieser Arbeit war trotz erschöpfender genetischer Teste die Eineiigkeit oder Zweieiigkeit nicht genau festgestellt worden. Daher wurde Hauthomotransplantation benutzt, um festzustellen ob sie monozygotischer oder dizygotischer Herkunft seien Eineiigkeit wurde bei dem einen Zwillingspaar durch das Dauerüberleben der gekreuzt ausgeführten Homotransplantation sicher gestellt.

In dem anderen Paar wurden die Hauthomotransplantate zwischen dem 19 und 22. Tage nach der Operation abgestossen. Dieses wurde als Beweis der Zweieigkeit angesehen da die Abstossung gegenseitig verpflanzter Homotransplantate bisher noch niemals in bewiesenen Fällen von Eineiigkeit vorgekommen ist. Der Gebrauch von Homotransplantaten erscheint daher eine durchaus annehmbare klinische Prozedur zu sein, um Eineiigkeit oder Zweieiigkeit diagnostisch sicherzustellen, z.B. in der genetischen Erforschung der Ätiologie hereditärer und kongenitaler Abnormitäten oder in gerichtsmedizinischen Problemen des Menschen.

La Utilizacion de Homoinjertos de Piel para Diferenciar Gemelos Monozigoticos y Dizigoticos. Blair O Rogers.

Homoinjertos cutáneos reciprocamente transplantados entre gemelos idénticos sobrevivirán permanentemente. Su conducta en gemelos no idénticos no ha sido reportada.

A pesar de pruebas genéticas exhaustivas no pudo determinarse si dos grupos de gemelos eran monongéticos y dingóticos para lograrlo se utili-

Histogramme et Spodogramme d'une Homogreffe de Peau Humaine, apres Huit Ans. FRANCESCO FIRINU

L'Auteur rapporte au Congrès de Chirurgie plastique de 1953, a Rome, un cas d'une excellente réussite d'homogreffe humaine avec un contrôle de Huit ans

Pour s'expliquer le cas, il a émis l'hypothèse que la réussite dépendait de la qualité et de la quantité d'hormone, la patiente se trouvant enceinte de huit mois

Il expose l'étude histologique ainsi que le spodogramme (étude des cendres tissulaires) la malade étant actuellement en phase de stabilisation (a) La peau du bras du donneur est inchangée (b) La greffe est bien supportée (c) La peau de la jambe de la patiente est inchangée
changée

Après avoir étudié l'histogramme et le spodogramme il montre que la peau de la région greffée conserve la même structure que celle du bras, ainsi que la qualité structurale qu'elle avait lorsqu'elle fut prise

Il conclut avec la conviction que la greffe cutanée, ou au moins l'homogreffe, conserve les qualités de la zône donneuse et de l'organe donneur

Histogramme und Aschengramme von einem Homotransplantat Menschlicher Haut nach acht Jahren FRANCESCO FIRINU

Der Autor stellte in dem Nationalkongress fur Plastikchirurgie des Jahres 1953 in Rom einen Fall von gut gelungener menschlicher Hautuberpflanzung mit sechsjahriger Kontrolle vor

Indem er versuchte, sich die Ursache zu erklaren, formulierte er die Hypothese, dass das Gelingen von der Qualitat und Quantitat der Hormone abhinge, weil die Patientin schon 8 Monate schwanger war

Da sie heute in der Phase der Stabilisation ist, stellt er das histologische und aschengraphische Studium dar (a) der unberuhrten Haut des Armes des Spenders, (b) der gut gelungenen Überpflanzung, (c) der unberuhrten Haut des Beines der Patientin

Nachdem er die Histogramme und Aschengramme gelesen und demonstriert hat, gibt er genau an, dass die Haut der Überpflanzungsgegend dieselbe Struktur wie die Haut des Armes zeight, und dass sie die strukturellen Eigenschaften bewahrt, die sie hatte, als sie entnommen wurde

Er schliesst mit der Bestatigung, dass das Hauttransplantat oder wenigstens das Homotransplantat die Eigenschaften der Entnahmestelle und des Spenderorganismus bewahrt

Histogramas y Cenizagramas de un homoinjerto de Piel Humana Despues de Ocho Años de Haber Sido Aplicado. FRANCESCO FIRINU

El autor expuso, en el congreso de Cirugía Plástica de 1953 en Roma, un caso de homoinjerto de piel humana que se integró, verificado durante 6 años

Al observar la integración expresó la hipótesis de que el éxito se debía a la calidad y cantidad de hormonas en circulación, dado que la paciente recibió el homoinjerto durante el octavo mes de embarazo

Actualmente durante el período de estabilización, despues de ocho años, expone el estudio histológico y cenizagrafico (a) de la piel integra del brazo del hombro que dio el homoinjerto, (b) del homoinjerto, (c) de la piel integra de la pierna de la mujer que recibió el homoinjerto

Despues de leer y demostrar los cenizagramas, señala que la piel del homoinjerto tiene la misma estructura de la piel del brazo del donador y por consiguiente ha mantenido los mismos carécteres estructurales que tenia al momento de obtenerlo

Concluye afirmando que el injerto cutáneo, o al menos el homoinjerto mantiene en su sitio receptor los caracteres de la región y organismo de origen

---

Vascular Reaction following Experimental Transplantation of Free Full Thickness Skin Grafts. SVEN BELLMAN, M D AND ERIK VELANDER, M D *Department for Physical Cell Research, Karolinska Institutet, the Department of Plastic Surgery, and the Department of Surgery, Serafinerlasarettet, Stockholm, Sweden*

One of the main problems in skin grafting concerns the vascularization of the transplanted material The circulation in the minute blood vessels of skin grafts has been studied especially by Conway, Stark and Joslin, using *in vivo* microscopic examination In a study of the early circulation in autografts in experimental animals (1951), they demonstrated the capillary budding and the parallelization of young vessels towards the graft one week after transplantation, and showed that ingrowth of young blood vessels from the subcutaneous tissue bed of the skin graft keeps pace with the marginal development of the blood vessels Taylor and Lehrfeld (1953), using similar methods in experimental autogenous skin grafts in rats, observed a slow circulation in the small blood vessels of the graft as early as the third day after grafting They attributed this finding to direct connection between the sectioned ends of capillaries in the graft and the recipient area Hynes (1954) in a histological investigation demonstrated empty

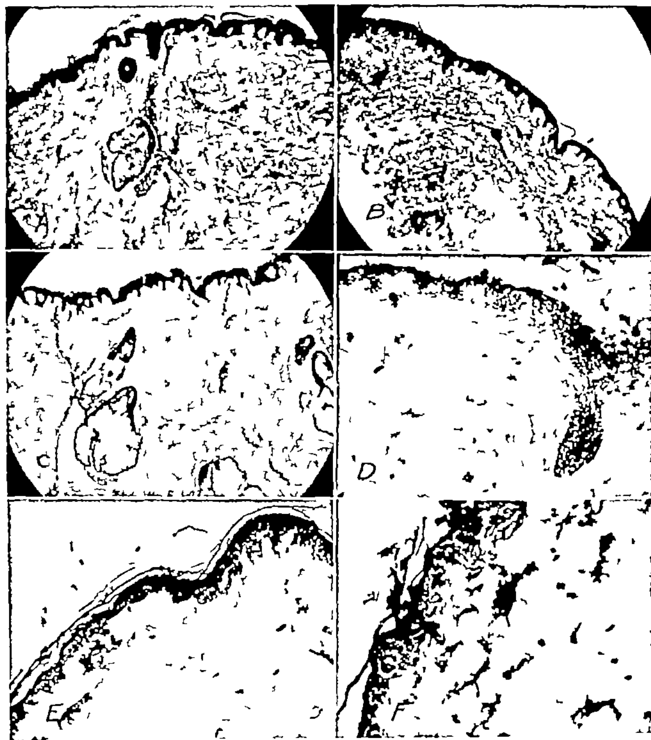


Fig 422

The magnifications of the histograms is 53 × the one of the ashes is much larger (157 ×)

Fig 422 D Ashegrams of the donor

Fig 422 E Ashegrams of the recipient.

Fig 422 F Ashegrams of the graft.

These ashegrams show the same histological differences shown by the biopsies.

The conclusion is then the human homograft maintains in the recipient area the same histological characteristics which are present in the donor

It cannot be excluded that the observation that I have made is only a temporary one and that maybe later-on the graft may assume a complete fusion

original blood vessels in the rotated grafts, none were detected which would have pointed to sufficient vascular bouchement contact to convey contrast medium to them

During the rest of the first week the vessels in the recipient area increased appreciably in size and a great number of small blood vessels migrated from the surroundings of the graft towards its center (Fig 424)

By the end of the first week, relatively large blood vessels had developed in this new vascular system in the graft area (Fig 425, a) Many of them anastomosed with the original, now hyperplastic, vessels in the recipient area

During the second week this abundant system of small and relatively large blood vessels was transformed Many of the large vessels were gradually reduced in size and finally disappeared Others increased and were remodeled (Fig 425, b) Small vessels often increased in size and played a part in the formation of large vessels, while large adjacent branches, already present in the system, disappeared It would seem that the many originally differentiated blood vessels were not sufficient material for the development of a hemodynamically efficient sparse blood vessel system and that new pathways were therefore made

The transformation of the blood vessels in the graft area then continued at a decreasing rate for several weeks When the final stationary condition had been reached, the blood vessels in the graft zone closely resembled the normal ones in adjacent parts of the ear The large veins had usually united, at the margin of the graft, with the cut ends of the large surrounding veins The arteries seldom showed this direct union, they mostly anastomosed with the surrounding arteries via slender branches (Fig 426)

The investigation has shown that some of the

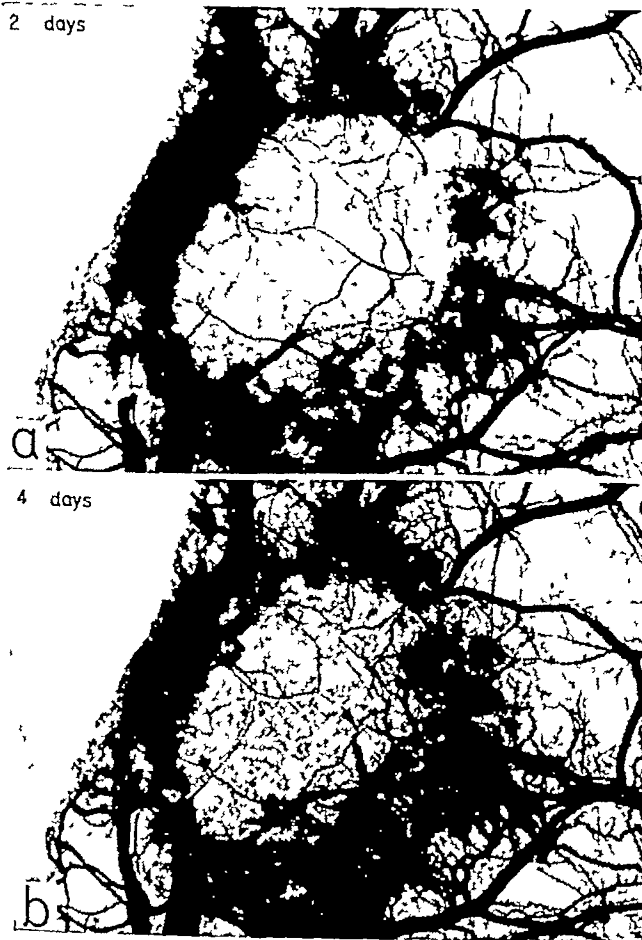


Fig 424 Microangiograms (× 2) from the graft area shown in figure 1, taken after longer intervals Blood vessels are reappearing in the recipient area There is appreciable formation of new vessels around the graft and beginning ingrowth of vessels into the graft area

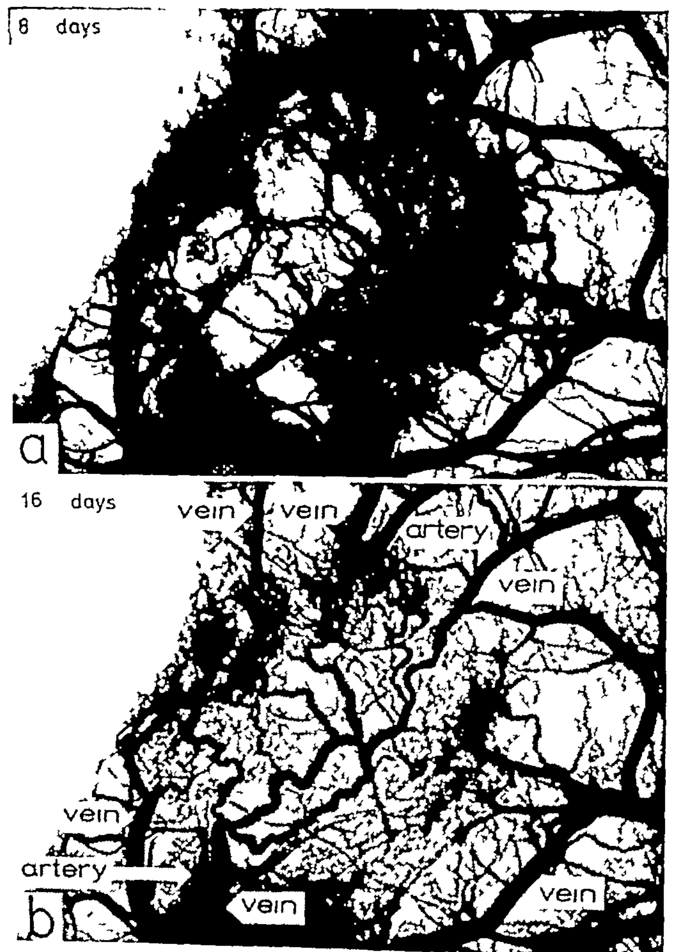


Fig 425 Microangiograms (× 2) from the same region as in figures 1 and 2, taken after 8 and 16 days respectively After one week numerous blood vessels have developed in the graft area, and after two weeks they have been reduced to a moderate number of large irregular vessels

capillaries in the graft during the first 20 hours after grafting, later on many of its vessels were of normal size and contained red blood cells. He assumed that these vessels first underwent spasm but later relaxed and were then filled from the recipient area with exudate containing blood cells.

Previous investigations have been mainly concerned with those parts of the vascular system that enter the grafted material but very little is known about the vascular reaction within the recipient area

It was recently shown that microangiographic methods greatly facilitate investigation of the transformation of fine blood vessel beds (Barclay 1951 Bellman 1953) These methods in which the small blood vessels are rendered radiopaque by the injection of suitable contrast media and then radiographed with special soft X rays, can be applied both to fixed specimens and to living tissue Such methods are now being applied at our laboratory in further studies of the vascularization process in various types of experimental skin grafts We propose to describe here the development of the circulation in autografts of skin as demonstrated *in vivo*

In this investigation we used living rabbits Free full-thickness circular skin grafts with a diameter of 10 mm were taken from the belly and sutured to a corresponding recipient area on the ear This zone had been denuded of tissue down to the perichondrium immediately before grafting In other animals a skin graft was taken from the ear then rotated and replaced. The sutures were of 6-0 nylon except for a few of fine steel wire that were used to mark the position of the suture line on the radiograms.

Microangiograms were taken before and at varying intervals after grafting The contrast medium was Thorotrast, which was warmed to body temperature before injection through a polyethylene tube inserted into the middle branch of the posterior auricular artery The microangiograms were taken during injection A Machlett AEG 50 T therapy X ray tube with tungsten target and beryllium window served as the X ray source. The voltage was 50 kV and the tube current 45 mA The X ray film was Agfa Printon Rapid, placed in close contact with the ear and shielded from light by aluminum foil 9 microns in thickness An exposure of 0.2-0.3 seconds was used The films were developed in Kodak D 19 b and enlarged by standard photographic methods The definition in the recorded image permitted magnification of 30-50 diameters.

It was found shortly after the operation that a fairly large number of fine and medium-sized blood vessels persisted in the graft area probably in the perichondrium (Fig 423)

Two days after operation further blood vessels were almost invariably demonstrable in the recipient area. These vessels, which had not been detected the previous day were all identifiable on the preoperative microangiogram (Figs. 423 and 424 a) At this time small blood vessels appeared around the suture line. Of the

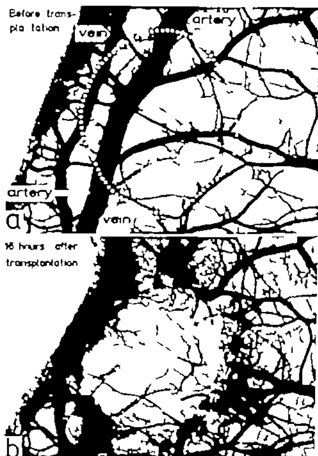


FIG. 423 Microangiograms (× 2) from a rabbit ear before and after grafting. The graft was rotated 90 The contour of the graft is marked on the preoperative microangiogram The contrast-filled blood vessels are black. Numerous small and medium-sized blood vessels are still present beneath the graft and can be identified on the preoperative microangiogram No rotated blood vessels are detectable.

porté l'étude microangiographique de la vascularisation du greffon et de la zone réceptrice Des micro-angiogrammes en série pris à divers intervalles après la greffe montrent que quelques uns des vaisseaux sanguins de la zone receptrice ne sont pas perceptibles jusqu'au second jour après l'opération Les vaisseaux de cette sorte augmentent de taille à partir du milieu de la première semaine Dès le 2e jour après la greffe, un lacis dense de petits vaisseaux sanguins se développent autour de la zone greffée et dans sa périphérie, au bout de quelques jours ces vaisseaux couvrent la totalité de la zone Au bout d'une semaine il y a un developpement de nombreux vaisseaux sanguins irréguliers et suffisamment importants dans la zone, un grand nombre d'entre eux se trouvent déjà réunis aux vaisseaux déja hyperplasiés de la zone réceptrice Au cours de la seconde semaine, de gros circuits se développent à partir de ce système et au bout d'environ 2 mois on arrive à un stade final dans lequel les grosses veines se trouvent directement réunis et les artères anastomosées par l'intermédiaire de longues branches fines Le lacis dense de fins vaisseaux sanguins régressent graduellement après la première semaine

Gefassreaktion nach Experimenteller Freier Transplantation von Vollhautlappen. Sven Bellman und Erik Velander

Durch Experimente mit autogenen Vollhauttransplantationen bei Kaninchen wurde die Vascularisation des Transplantats und des Transplantatbettes mittels der Microangiographie untersucht Bei serienmassigen Microangiogrammen, die in Bestimmten Abstanden nach der Transplantation untersucht wurden, waren einige der Blutgefasse in dem Transplantatbett vor dem 2 Tag nach der Operation nicht zu finden Von der Mitte der ersten Woche an nahmen die Gefasse dieses Gebietes an Grosse zu Von dem zweiten Tage nach der Transplantation an entwickelte sich ein dichtes Netzwerk kleiner Blutgefasse in der Nahe der Transplantationsstelle und dessen Umgebung Innerhalb weniger Wochen erstreckten sich diese Gefasse in den gesamten Bezirk Nach einer Woche hatten sich zahlreiche, ziemlich grosse, unregelmassige Blutgefasse in diesem Gebiet entwickelt Viele von ihnen vereinigten sich mit den nun hyperplastisch gewordenen Gefassen des Transplantatbettes Wahrend der zweiten Woche entwickelten sich von diesem System aus weite Verbindungswege und nach etwa zwei Monaten wurde ein endgultiger Zustand erreicht, in welchem die grossen Venen sich direkt vereinigt hatten und die Arterien durch lange schlanke Anastomosenaste miteinander verbunden waren Das dichte Netzwerk feiner Wundgefaße bildete sich nach der ersten Woche allmahlich zuruck

Reacción Vascular Despues del Transplante Experimental de Injertos de Piel de Todo Espesor. Sven Bellman y Erik Velander

Se estudió la vascularización del injerto y del área receptora por medio de microangiografía en una investigación experimental con injertos de piel de todo espesor en conejos En microangiografías seriadas, tomadas a interválos variables despues del injerto, se notaron algunos vasos sanguíneos en el sitio receptor hasta el segundo dia despues de la operación Los vasos en esta área aumentaban de tamaño desde la mitad de la primera semana Desde el segundo dia postoperatorio se desarrolló una densa malla de vasos sanguíneos pequeños alderredor del área de injerto y en su periferia, algunos dias mas tarde esos vasos cubrían el área completa Despues de una semana numerosos vasos largos e irregulares se han desarrollado en el área, muchos de ellos se unen con los vasos de la zona receptora, ahora hiperplásicos Durante la segunda semana, grandes vías se desarrollan desde ese sistema y despues de dos meses o sea cuando se alcanza el estadio final hay tenues ramas que unen el sitio directamente a las venas y arterias La malla densa de finos vasos sanguíneos regresa gradualmente despues de la primera semana

---

B. *Cartilage and Bone*

A Study on the Vitality and Behaviour of Rib Cartilage Grafts in the Animal.

Tadeusz Kostek, M D , Docent, *Plastic Surgeon of the III Surgical Clinic of the Academy of Medicine, ul Wiejska 15 m 11, Warsaw, Poland*

Among tissues believed to survive homotransplantation there are the corneal and cartilage graft which share in common the property of being avascular However there is still some uncertainty as to criteria of vitality, the survival time, the question of how young the transplant must be to still give positive results, and the immunological mechanism involved In the following only the cartilage graft and its relation to the transplantation problem will be discussed

Criteria of Vitality

As to the criteria of vitality of the cartilage graft, most authors [1, 2, 3, 4, 5, 6, 7] rely on the

blood vessels in the recipient area are occluded during the first day after operation and are open to the bloodstream from the second day It is not clear whether this occlusion is due to spasm induced by the surgical trauma or has some other cause An appreciable extension of the blood vessels already present in the recipient area occurs as from the second day coincidently with the entrance of a new vascular system from the periphery In the new blood vessel network relatively large pathways are differentiated but only a few of them persist these undergo transformation and increase in size The end result is a vascular system very closely resembling the preoperative state of the grafted area.

The characteristic vascularization of graft zones as described here is related to the total



Fig 426 Microangiogram (× 2) from the same ear as in the preceding figures showing the vascular system when the transformation is almost complete The veins are now directly united and the arteries anastomose via long slender branches Part of the dense network of fine blood vessel remain in the periphery of the graft area and around it. The shadow in this region is due in part however to thickening of the tissue A slight shrinkage of the ear contour can be seen at the lateral margin of the graft.

local reaction no attempts were made in the present work to distinguish those parts of the vascular system which lay in the recipient area and those in the graft itself This aspect will be treated in a subsequent paper

Summary

In an experimental investigation with autogenous full thickness skin grafts in rabbits the vascularization of the graft and the recipient area was studied microangiographically On serial microangiograms taken at varying intervals after grafting some of the blood vessels in the recipient area were not detectable until the second day after operation. The vessels in this area increased in size as from the middle of the first week. As from the second day after grafting a dense network of small blood vessels developed round the graft area and in its periphery and within a few days these vessels covered the whole area After one week numerous fairly large irregular blood vessels had developed in the area many of them were united with the now hyperplastic vessels in the recipient zone. During the second week large pathways developed from this system and after two months or so a final state had been reached in which the large veins were directly united and the arteries anastomosed via long slender branches The dense network of fine blood vessels gradually regressed after the first week.

References

1 Barclay A F Micro-arteriography Blackwell Scient Publ Oxford 1951
2. Bellman, S Microangiography Acta Radiol. Suppl 102, 1953
3 Conway H., Stark R. B and Joslin D Observations on the development of circulation in skin grafts. Plast. & Reconstruct Surg 8 312 1951
4. Hynes W The early circulation in skin grafts with a consideration of methods to encourage their survival. Brit J Plast. Surg., 6 257 1954.
5 Taylor A C and Lehrfeld, J W Determination of survival of skin homografts in the rat by observation of vascular changes in the graft. Plast & Reconstruct Surg., 12 423 1953

Réaction Vasculaire Consecutive a la Transplantation Experimentale de Greffes Libres de Peau Totale Sven Bellman et Erik Velander

Une étude expérimentale faite chez le lapin à l'aide de greffes autogènes de peau totale a com-

observed no growth of homologous cartilage from "young" and adult rabbits implanted at the privileged site of the anterior chamber of the eye. Mayeda,[25] who experimented with parabiotic animals, remarks that "rats above 150 grams of weight have already strongly developed their biological specificity," suggesting that the age of an animal of this weight may be related to the specificity.

It is only during the past few years that investigations have thrown some light on the question of individual specificity, which, with regard to the transplantation problem, is equivalent to immunological maturity. It is now generally accepted that the capacity to produce antibodies in birds and mammals appears relatively soon after hatching or birth and that natural antibodies do not appear until after some weeks in postnatal life.[26, 27] Insofar as the transplantation problem is concerned, the terms "young" and "adult" have thus become more precise. In experimentally produced tolerance, 5-10 per cent of mice inoculated within 12 hours of delivery with living tissue antigens will prolong the survival of skin homografts from the same or an isogenic donor when transplanted in adult life.[28] Definite survival was obtained with skin homografts in chicks if grafted during the first 3 days after hatching.[29] However it has been shown by the same authors that antigenicity of chick skin developing from the first days of hatching is not completely formed until the 14th day and that the same is true with the period of host tolerance, which decreases rapidly during the first decade of life. It follows that the term "young" should cover the immunological youth of an animal or tissue and be confined to the first few days of immunological immaturity.

The Immunological Mechanism

There is no clear immunity concept with regard to cartilage transplantation. An attempt was made to explain the survival of a cartilage graft by the special morphological structure of this tissue, in that the capsule enclosing the chondrocytes would not allow the cell antigen to pass into the host organism. However it would be difficult to understand how such a cell is to live at all if unsurmountable barriers were to impede its metabolic exchange.

The extremely low rate of the cartilage metabolism is a well known fact, corroborated by Laskin et al. in the study cited above. It is on this basis that Burger[30] propagated the conception of "bradytrophic tissues," including amongst these: cartilage, the intervertebral disc, the cornea, the lens, the tympanic membrane, some layers of the large blood vessels, and scar tissue. He considers these tissues especially suitable for long survival after grafting owing to their practically anaerobic metabolism. Lopashov and Strojeva[31] turn attention to the different survival times of various tissues in the animal and give the following order of tissue destruction after homotransplantation: brain cells > eye cells > epithelial cells of the internal ear > epidermis > pigmentary cells > heart > cornea > cartilage. Kossiakov[32] defends the immunological concept of tissue transplantation and believes that the long-term survival of the cornea, the cartilage and the bone graft is due to the low potency of their antigenic properties.

Virchov has already drawn attention to the avascularity which the cornea and the cartilage share in common, but he admitted the possibility of an "avascular inflammation" of these tissues (cited by Mayeda). Since the immunological behaviour of the cornea homograft is attributed to its avascularity, it may be useful to review the modern concept of cornea transplantation.

Billingham and Boswell[33] have carried out experiments which, according to the authors, make it clear that "cornea is not an immunologically privileged tissue, but a tissue in an immunologically privileged position." They verified this thesis by grafting shavings of homologous cornea to richly vascular beds prepared in the skin of rabbits. The grafts became vascularized and after some time broke down, as do skin homografts. From these and other experiments it was inferred that avascularity is a *sine qua non* of successful cornea grafting. It also has been demonstrated[34, 35] that the cornea graft, like skin, obeys the second set law of tissue transplantation and that the corneal epithelium and skin have a common antigen. According to Maumenee[34] the experiments quoted cannot serve as an absolute proof that corneal homografts are capable of producing an immune response, for corneal epithelium does not survive transplantation. Yet conclusions similar to

histological examination of the fixed material in spite of the inconvenience of the static morphological picture on which the procedure is based. This picture does not give us sufficient information about the dynamic state of the tissue, its metabolic processes and potentialities which are the standards of vitality. Summarizing the histological picture of the stained sections of his transplants Davis[3] writes that "the whole impression was that of living cartilage." It is *felt that the doubt expressed here may be an* indication of the shortcomings of the method.

According to Boerner (cited by Seggel[8]) the histological method does not provide an irrefutable proof of vitality of the cartilage cell. He found good staining qualities of the cell nucleus even 14 days after grafting of dead cadaver cartilage in the rabbit, whereas Ostrowski and Kostek[9] using the method of vital staining found the upper limit of post mortem survival of cartilage to be 48 hours after death. It may therefore be suggested, that for investigations of tissue vitality only biological methods should be accepted.

No approach to the question of vitality of the cartilage transplant by means of labelled sulfur could be found in the literature nor, as far as could be ascertained, has the bioelectrical method been applied. The tissue-culture method seems to be unsuited, for differentiation of chondrocytes to fibroblasts may occur[10] thus interfering with the interpretation of the results. The most valuable functional methods advocated for active transplants[11, 12] are not applicable in the case of the cartilage graft.

Laskin et al[13] studied the metabolism of transplanted rib cartilage, which has not the disadvantage of inhomogeneity of the bone transplant.[14] They concluded that fresh cartilage has an extremely low metabolic rate and found that autogenous and homogenous transplants gave well defined values for both respiration and anaerobic glycolysis as proof of the presence of living chondrocytes.

The demonstration of the growth of a cartilage transplant cannot be regarded as a direct proof of vitality since dead transplants of the mesenchyme type are often replaced by host tissue and increase in size may be brought about by appositional growth. For the rest appositional growth by metaplasia of the surrounding tissue was claimed for the cartilage graft, even the dead one which according to Nasonov acts so by induction.[15]

Earlier experiments with the method of vital staining[16, 17, 18] have proved its reliability in demonstrating cell vitality. On this basis Ruzicka[19] even worked out a differential vital-lethal staining method. Rehn and Ruef[20] summarized the importance of vital staining for the research of cartilage vitality. Dustin[21] has given a concept of the mechanism involved in vital staining with neutral red, while Zwejbaum and Glowiczer[22] demonstrated the direct relationship between cell vitality and the ability of the cell to segregate this dye in the vacuolar system of the cell in the form of the well known sharply defined granules.[23] Details of the method are discussed in a study by Ostrowski and Kostek[9] on the vitality of cartilage tissue conserved at low temperatures. In a paper on the growth of human cartilage, Peer[6] mentions the method but no details are given.

Survival Time

There is no concordance in the literature as to the period from the moment of transplantation that is significant for definitive survival. The generally applied term "long term survival" may suggest definite survival but only at the cost of accuracy. Obviously a follow-up period of the whole life-span of a recipient would be the most exact, but for practical reasons this is hardly feasible and, as will be discussed later, the results of such a long observation may not always be conclusive. However observations should be prolonged to a point when the ordinary central sclerosis of the cartilage graft (rib articular metaphyseal) has advanced very near to the surface, leaving only a tiny layer of chondrocytes beneath it. With cartilage of the embryonic type this would take about one year in the rat and guinea pig.

Age of the Donor

On this question too there is no clear opinion. In earlier studies[1, 2, 24] attention was turned to the fact that embryonic tissues may be transplanted with good results. Zahn reported on the survival of homologous and heterologous embryonic cartilage transplants in the rabbit and the cat, whereas negative results were obtained with cartilage of adult donors. Leopold

after fixation and staining with hematoxylin-eosin

Results Grafts adhere firmly to the graft bed They are unaltered macroscopically, but during the first 2 weeks hyperemia and edema of the surrounding soft tissue was noted All fresh slices showed positive vital staining of the granular type as good as the controls The growing old of the implants, i e the physiological regressive changes described above, seemed to parallel those in controls of corresponding age In the following on some of the results of the histological findings are reported

4-day-old grafts The graft is a piece of hyalin cartilage showing well stained chondrocytes over the entire section In the surrounding tissue next to the graft there are fibrin masses distending the bundles of connective tissue (of the fascia) and a considerable wide band of granulation tissue containing numerous capillary blood vessels, fibroblasts, fibrocytes and abundant collections of round-cells recognizable as plasma cells and lymphocytes It is obvious that mononuclear cells are an essential part of this granulation tissue Leukocytes, neutrophilic as well as eosinophilic, are seen only sporadically (Fig 428, A)

8-day-old grafts Around the unaltered cartilage graft a large band of tissue response of the productive type of inflammation is seen No signs of exudative inflammation The granulation tissue around the cartilage is very rich in cells with only very few capillary blood vessels It contains mainly fibroblasts Between them abound collections of mononuclear cells On the periphery of the granulation tissue band more eosinophils appear than on the 4th day (Fig 428, B and C)

26-day-old grafts In the center of the graft more interstitial substance of the basophilic type appear, indicating that this part of the graft is growing old Stratification occurs, in that the central chondrocytes increase in size and those on the periphery develop into a dense layer of cells running parallel to the surface Next to the graft with its clean-cut perichondrium, there is strongly acidophilic fibrous connective tissue To the latter a large band of fibroplastic granulation tissue adheres, on the periphery of which collections of plasmocytes and lymphocytes are seen No more eosinophils were found (Fig 428, D)

125-day-old grafts Rather limited spotted sclerosis of the central parts of the graft The sclerotisized areas contain shadows of dead chondrocytes even in the center of the graft, on the periphery of which a wide layer of well preserved cartilage cells are seen Around the graft a narrow band of hyalinising connective tissue Insignificant response in the surrounding tissue (Fig 428, E)

212-day-old grafts Central sclerosis more pronounced than in the foregoing graft The spotted sclerotic areas underwent necrosis, but still numerous well stained cells even in the center Insignificant response in the host tissue (Fig 428, F)

288-day-old grafts A narrow band of hyalinized perichondrium, no fragmentation, no signs of invasion of the graft, a few open capillary blood vessels in the surrounding tissue without any infiltration Hyalinisation and calcification as in the control of a 300-day-old rat but more chondrocytes are seen in the capsules of the graft (Fig 429, A)

300-day-old control Thickened and hyalinized perichondrium Well preserved cartilage cells only on the periphery of the cross section In the centrum a small amount of capsules Some of them are empty, in a few chondrocytes are seen The thickened matrix shows violet-pinkish staining and numerous calcification plaques extending until near the surface These are signs of old cartilage (Fig 429, B)

Series III Heterografting of ten rats as in Series II, with rib cartilage from a litter of five-day-old guinea-pigs The behaviour of the grafts, macroscopically, as to vital staining and histologically was similar to that of the homografts described, up to the 92nd day after transplantation On the 130th day all grafts were found to be dead

Series IV Homografting of 10 rats as in Series II, but with ear cartilage from five-day-old rats Four weeks later the host rat was grafted with full thickness skin, 8 x 8 mm in size, from the same donor These experiments were done in order to gain an understanding of the immunological mechanism involved

Results The median survival time of these skin grafts was even longer than in a control series (10 and 8 days respectively) while one graft was still alive 32 days after transplanta-

those of Billingham and Boswell were drawn by this author on the basis of delayed clouding of corneal homografts in the rabbit one to three weeks after insertion into the abdominal wall of a skin graft from the same donor in order to increase the amount of antigen introduced due regard being paid to the dosage phenomenon However there were "a number" of transplants which did not show opacification although the surrounding recipient cornea and even the graft itself were invaded by vessels In a series of corneal heterografts the same author observed preservation of complete transparency thanks to the suppression of vascular invasion and that in a parallel series of vascularized heterografts they all became opaque in three weeks As can be seen there also remain gaps in the immunity concept of the better explored corneal graft

Experimental

In all experiments white rats weighing about 200 grams served as hosts. An attempt was first made to use rib cartilage homografts from adult animals However the results were irregular and inconclusive The regressive changes in the graft were found to be accelerated and in some instances death occurred some time after transplantation Transplantations were therefore continued with cartilage of the embryonic type In a previous study [9] it has been found that articular cartilage of the newborn animal during the first two weeks of postnatal life resembles that in the embryo Thereafter histological differentiation starts and the cartilage undergoes slowly regressive alterations and an increasing central sclerosis (calcification) The same although a little delayed holds also for rib cartilage Throughout the experiments homografting was then done with rib cartilage of five-day-old unrelated rats and heterografting with equal-aged guinea pig rib cartilage It has been presumed that these grafts may be regarded as immunologically immature Autografting was done only with the mature rib cartilage of the adult rats. In all 130 separate cartilage grafts were used

Series I Autografting of 10 rats Under ether anesthesia and ordinary precautions a single full thickness rib cartilage of 6 mm in length with perichondrium was excised and inserted into the interfascial space between the superficial and deep fascia of the back of the same animal The small incision in the superficial fascia was closed with a single fine silk suture. Primary healing occurred in all cases. At regular intervals up to 158 days the implants were removed and tested for vitality by staining slices (cut by hand with a razor blade) with neutral red in 1 20,000 Ringer's solution for 15 min. at 37 C

Results In all instances the grafts were firmly adherent to the underlying tissue. In the early stages after grafting abundant central sclerosis extends in some grafts close to the thin marginal layer of non altered well preserved chondrocytes containing the red stained granules of the cells' vacuolar system In one case 130 days after grafting the cartilage was found to be dead. Similar findings after staining with hematoxylin-eosin (Fig 427)

Series II Homografting of ten rats Full thickness rib cartilage with perichondrium from a litter of five-day-old rats was inserted as above. In order to prolong the observation time and bearing in mind the dosage law each animal received 4 cartilage implants 6 mm in length, from a single donor Thus from each recipient the grafted material could be removed up to four times This offered the advantage of continuity of the observations in each animal. The implants were removed after 4, 6 8 14 and 26 days and then at various intervals up to 288 *days after grafting and examined both in the* fresh state by vital staining as above and histologically together with the surrounding tissue



Fig 427 Cross section of a rib cartilage graft 158 days after transplantation. Hematoxylin-eosin (× 60) Marked central calcification and necrosis. Well preserved chondrocytes

TABLE I EXPERIMENTAL CARTILAGE GRAFTING

Author	Host animal	Cartilage grafted	Type of grafting and donor age		Follow up period (in days)	Method	Results
Leopold	Rabbit	Metaphysial	[1] Embryonic [2] Young [3] Adult	Homo	205	Gross observation and histological	[1] Growth until 300× of original size [2,3] No growth
Saltykow	Rat Guinea-pig Mouse	Extremity	Adult	[1] Auto	181	Histological	[1] Survival
			Embryonic	[2] Homo [3] Hetero	148 133		[2] Survival [3] Survival up to 82 days, death after 183 days
Dupertuis	Rabbit	Ear	Average 17.6 days	[1] Auto	253	Gross observation and histological	[1] Growth ca 2× of original size
			Average 20 days	[2] Homo	223		[2] Measurable growth
Laskin, et al	Rabbit	Rib	Adult	Auto Homo	150	Metabolism	Metabolic exchange preserved
Kostek	Rat	Rib	Adult	[1] Auto	158	Vital staining and histological	[1] Survival
			5-day-old	[2] Homo [3] Hetero	288 130		[2] Survival [3] Survival up to 92 days, death after 130 days

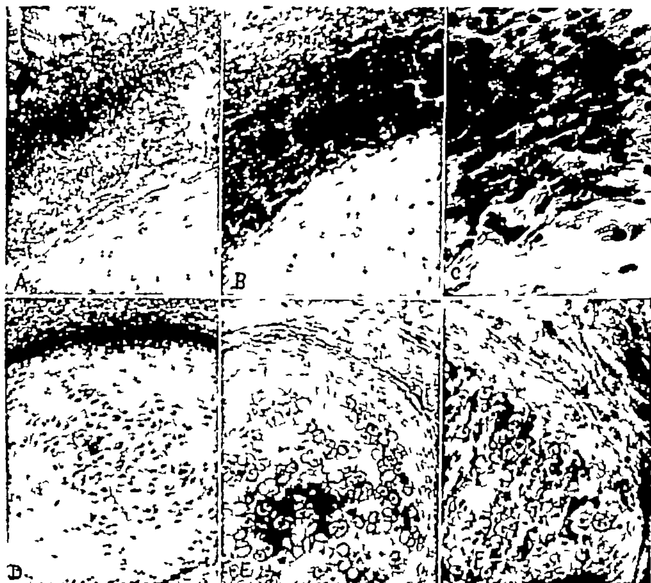


Fig 428 Microscopic sections of rib cartilage homografts. Hematoxylin-eosin A. After 4 days an infiltration band of mononuclear round-cells around the cartilage (beneath) Note the embryonic type of cartilage no stratification of the chondrocytes B After 6 days the infiltration became more dense. C (× 320) the same as in B showing the mononuclear type of graft bed response D After 26 days, showing the already developing stratification of the cartilage details in the text E. After 125 days, spotted sclerosis of the graft well preserved chondrocytes in the center and on the periphery Insignificant response in the surrounding tissue (above) no invasion F After 212 days the spotted sclerotic areas underwent necrosis but still well stained cells remained even in the center

tion In no instance was there a shortening of *the survival time of the test graft*

The cartilage implants were removed one two and three weeks after skin grafting and all were found by vital staining to be alive (Fig 430)

Discussion and Conclusions

In Table I the results of experimental cartilage grafting obtained by the author are compared with those obtained by some other investigators using different methods They confirm the use*fulness of embryonic cartilage for homotrans*plantation The method of vital staining parallels that of Laskin s et al. experiments concerning the cartilage metabolism, but our investigations allowed observations of the cartilage of the embryonic type during a period nearly twice as long as their experiments with adult cartilage As to the survival time of heterografts our results are close to those of Saltykow [34] Also the pictures of adult cartilage autografts de-

not the only reason believed to be responsible for the survival of foreign cartilage Moreover it speaks in favour of the second of the alternatives for the immunological mechanism mentioned above, i e for the antigenicity of the cartilage tissue However there may be a difference between the antigenicity of the homograft and that of the heterograft, which in our experiments permitted the homograft to survive during the entire observation time and nearly three times as long as the heterografts This difference may be a qualitative one On this occasion, it may be noted, the death of the cartilage heterograft proves the sufficiency of graft dosage in the above experiments

Theoretically at least one may question whether the cartilage homograft does not contain incomplete antigens and, being possibly a hapten it would paralyse the immunological resistance of the host to a later graft isogenic with it This consideration reflects the idea of actively acquired tolerance in the way discussed by Medawar [39] The confirmation of this hypothesis could be of practical value, for it would make it possible to introduce tolerance by grafting a recipient with cartilage prior to the intended transplantation of tissue or of an organ from the same donor Our skin test experiments at least do not exclude such a possibility

The results obtained give a negative answer as to the advisableness of the use of cartilage heterografts in reconstructive surgery, as has been previously believed by the author [40] They suggest on the contrary the use of fresh cartilage homografts of the embryonic type for plastic repair

SUMMARY

1 Rib cartilage of the animals used resembles morphologically, during the first two weeks of postnatal life, foetal cartilage and may be regarded as cartilage of the embryonic type For transplantation studies only this cartilage merits the term "young "

2 Only biological methods of vitality testing should be accepted Vital staining with neutral red is a reliable criterion of cartilage vitality It is a simple, quick and inexpensive method

3 In a series of experiments, in which, in all 100 separate cartilage grafts have been used, it has been shown that

(a) Autotransplants of adult cartilage were alive 158 days after transplantation, but underwent faster regressive changes than in the controls

(b) Cartilage of five-day-old homografts were still alive 288 days after transplantation

(c) Cartilage of five-day-old heterografts from the guinea-pig were still alive on the 92nd day of transplantation, on examination after 130 days they were all dead

4 It may be supposed that the cartilage homograft of the embryonic type definitely survives Death which may occur with more prolonged observations than ours could be attributed to the degenerative changes which may be observed as a physiological condition of the cartilage tissue, but more pronounced after grafting and probably due to impaired nutritional conditions

5 The mononuclear round-cell infiltration in the host tissue observed already during the first few days after grafting, is a transitory, inflammatory response, at first of the exudative, thereafter of the productive type This response has no detrimental effect on the homograft, nor does it invade the heterograft It dies away in the course of time

6 The results of cartilage homografts followed by skin test grafts from the same donor suggest that the second set law does not hold true in this cartilage graft However this remains to be proved in further experiments

7 Avascularity and the low metabolic rate alone of the cartilage tissue do not explain the different survival periods of foreign cartilage grafts the heterograft, found to be dead after 130 days, was as avascular as the homograft which was still alive after 288 days The embryonic homograft survives possibly because it has not yet developed specificity, or perhaps it does not contain complete antigens The possibility of using cartilage grafts of the embryonic type for introducing tolerance should be studied

8 Fresh postnatal cartilage of the embryonic type may be used as a homograft for plastic repair

ul Wiejska 15 m 11,

ACKNOWLEDGMENTS

I would like to express my profound gratitude to my teacher in plastic surgery, Professor Francis Burian, for his support in this study The experiments were started in Prague during a one-year



Fig 429 Comparable microscopic sections demonstrating the final results of the cartilage homografts. A. A 288-day-old homograft hyalinisation and calcification as in the control but even more living chondrocytes are seen B Cross section of a 300-day old control showing severe degenerative changes extending until near the surface

scribed by this author are similar to ours and support the observation of accelerated regressive alterations as interpreted by Burian some years ago [37]

Despite the long term follow-up of the homografts no definite answer can be given to the question concerning its final behaviour precisely because of the fact that acceleration of degenerative changes occurs even in the autotransplant. They probably are due to less favorable nutritional conditions of the orthotopic transplant Hence if an autotransplant dies as found in one case of our Series I this may also be expected in a homotransplant. Practically a 288-day survival of a cartilage homograft in the



Fig 430 Cross section of a fresh 220-day-old homograft demonstrating vital staining Characteristic fine granulation is seen within the chondrocytes.

rat may be considered almost as final, provided that subsequent possible death of an equivalent homograft in man will not cause shrinkage or distortion of the graft, thus impairing its clinical use

As to the biological side of the question some observations remain to be discussed

To the pathologist the response of the host tissue surrounding the graft appeared as an inflammatory reaction at first of the exudative, thereafter of the reproductive type It may be pointed out that the acute inflammatory reaction sets in from the beginning of cartilage grafting and not after a variable period as in the skin homograft [38] although morphologically the response is similar to that described in skin homografts a massive round-cell reaction of the graft bed. However there is no direct invasion of the graft itself as in other tissues known to undergo destruction after grafting While the round-cell invasion of other grafts ends with their break down in the case of cartilage the similar response of the host tissue around the graft has a transitory character dying away in the course of time without exerting any harmful influence upon it. In this respect two conclusions may arise (a) the round-cell response is not immunologically specific or (b) cartilage withstands the invasion by the mononuclear cells.

Assuming that the immunological conflict is a systemic response and that the antibody production after grafting is not organ-specific but directed also against some other tissues of the same donor as has been demonstrated in various experiments Series IV with skin testing was applied. However it was not possible to verify the second set phenomenon in these experiments. Provided they are conclusive which still remains to be proved in a larger series than ours and under different conditions this fact would suggest that (a) with the cartilage homograft of the embryonic type there is no effective immunological response of the host, or (b) the antibody production is too weak to provoke a breakdown of the graft, perhaps because of too slow a penetration of small quantities of antigen into the host possibly due to the low metabolic rate and the avascularity of this tissue

The final death of the heterograft should add to an understanding of the immunological mechanism in cartilage transplantation It indicates that avascularity of this tissue is at least

Eine Studie uber die Vitalitat und das Verhalten von Knorpeltransplantaten beim Tier. TADEUSZ KOSTEK

An Ratten wurden Auto-, Homo- und Heterotransplantationen von Rippenknorpel vorgenommen Fur die Homo- und Heterotransplantation embryonnaire La coloration vitale par du rouge kam Knorpel von 5-Tage alten Tieren zur Anwendung welcher als Gewebe embryonalen Typus' betrachtet werden darf Vitalfarbung mit Neutralrot ist eine biologische, einfache und schnelle Methode Sie darf als zuverlassiges Kriterium der Zellvitalitat betrachtet werden Homogene Transplantate wurden noch 288 Tage nach der Verpflanzung in lebendem Zusatand angetroffen, hingegen waren heterogene Transplantate nach 130 Tagen in allen Fallen bereits abgestorben Es darf angenommen werden, dass das homogene Knorpeltransplantat vom embryonalen Typus definitiv am Leben bleibt Das Rundzelleninfiltrat das umgebenden Gewebes, das als Ausdruck einer Immunitatsreaktion des Empfangers gilt, hat keine nachteilige Wirkung auf das Knorpeltransplantat Es scheint, dass im Falle der Knorpelverpflanzung das Gesetz der abermaligen Transplantation "second set law" keine Gultigkeit hat Die Moglichkeit der Vorbehandlung des Empfangers mit einem embryonalen Knorpeltransplantat zur Erzielung einer Einheilung eines nachfolgenden Gewebstransplantats von demselben Spender sollte naher untersucht werden

Un Estudio de la Viabilidad y Comportamiento de los Injertos de Cartilago Costal en los Animales. TADEUSZ KOSTEK

Se efectuaron auto-, homo-, y etero-transplantes de cartílago costal en ratas Para los homo- y hetero-injertos de cartílago se usaron animales de cinco días Este material puede ser considerado como un tejido de tipo embrionario El rojo neutro, como coloración vital, dá un método biológico simple y rápido, dando un criterio digno de confianza en cuanto a la vitalidad celular Los homoinjertos estaban vivos 288 días después del transplante Los eteroinjertos murieron en todos los casos después de 130 días Se puede suponer que el homo-injerto de cartílago usado sobrevivió definitivamente La respuesta mononuclear en los tejidos vecinos, conocida como, la reacción inmunológica del huesped, no tiene ningun efecto sobre el injerto de cartilago Puede ser que la segunda ley no sea verdadera en los injertos de cartílago embrionario La posibilidad de usar homoinjertos de cartílago de tipo embrionario para inducir la tolerancia de los tejidos debe estudiarse La falta de vascularización del tejido cartilaginoso no explica su tiempo tan prolongado de supervivencia

An In Vitro Test for the Vitality of Adult Human Cartilage; Its Application to Problems of Cartilage Grafting and Storage. THOMAS GIBSON, M B, F R C S Ed, F R F P S G, AND ROBERT C CURRAN, M B, Ch. B, *Glasgow, Scotland*

There is a need for a simple, reliable test of vitality in studying certain aspects of human cartilage behaviour, notably the fate of cartilage grafts and the storage of cartilage in a viable state Histological examination alone is inadequate cellular autolysis is presumptive evidence that the tissue was dead when fixed but the absence of autolysis does not necessarily mean that it was alive Cellular proliferation after transplantation or in tissue culture, irrefutable evidence of vitality in other tissues, either does not occur or is such a slow process that it is valueless as a criterion of vitality Adult cartilage, too, differs from most other tissues in possessing a very low rate of metabolism which is almost wholly of an anaerobic pattern (Bywaters 1937) Manometric observations are thus unreliable, especially when small pieces are under examination

The test of cartilage vitality which has been devised (Gibson, Curran and Kennedy 1955, Curran and Gibson 1955) is based on the fact that sulphur, as sulphate ion, is metabolised by cartilage cells and finally incorporated in the chondroitin sulphate of the matrix If the radioactive isotope S_{35} is injected into mice, it can be shown by autoradiography to be rapidly taken up and "fixed" by the mature chondrocytes An exactly similar reaction occurs in vitro if pieces of fresh adult human cartilage are incubated with radioactive sulphur The standardised technique is as follows A thin slice of the cartilage to be tested is placed in 2 ml of Tyrode's solution in a roller tube Each ml of Tyrode's contains 1 μc of S_{35} The tube is incubated for 48 hours at 37°C after which the cartilage is fixed, paraffin sections prepared and autoradiographs made by the stripping film technique The exposure time is 15 days for the coarse grain emulsion and up to 60 days for fine grain film Wide variations in quantities and times are permissible for purely qualitative results, but standardisation allows of comparative measurement

stay at the Clinic of Plastic Surgery and finished in Warsaw

Grateful acknowledgment is made to Mme. M Kobuszewska, M D., Asst. Professor of the Institute of Pathological Anatomy of the Academy of Medicine in Warsaw for her examination and interpretation of the fixed histological specimens

REFERENCES

1 Zahn F W Arch f path. Anat 95 369 1884.
2 Leopold G Virch Arch f path. Anat 85 283 1881
3. Davis, J S Ann Surg., 65 170 1917
4 Gibson Th and Davis, W B Brit. J Plast Surg 6 4, 1953
5 Peer L. A Plast. Reconstruct Surg., 1 108 1946
6 Dupertuis S M Arch of Surg., 43 32 1941
7 Vinogradova, T P The cartilage transplantation in man Acad of Med Science of S. U., Moscow 1950
8 Seggel R Deutsche Zeitschr f Chir 75 326 1904
9 Ostrowski K., and Kostek T Folia Morphologica (Polish) No 2 101 1953 English abstract in Bulletin de l Acad Polonaise des Sciences, V 1 No 1 1953.
10 Cranun E C La culture des tissus en biologie expérimentale Masson et Cit., Paris, 1931
11 Woodruff M F A. Ann. Royal Coll. Surg of Engl., 11 173 1952.
12 Green H S. N Ann N Y Acad Sc., 59 311 1955
13 Laskin D M Sarnat B G., and Bam, J A Proc. Soc Exp Biol. 79 474, 1952
14. Roth H. *Die Konservierung von Knochengewebe für Transplantationen.* Springer Verlag, Wien, 1952 p 79
15 Vinogradova, T P s pos 7
16. Möllendorf W von Anat. Hefte 53 89 1916
17 Fischel A. Anat. Hefte 16 417 1901
18. Lotsin, R. Anat. Anzeiger 55 369 1922
19 Růžička, V Rozpravy České Akademie Ročnik XIV třida II č. 4, str 1 27 (Czechoslovakia)
20. Rehn, E. and Ruef H Neue Deutsche Chir., 2 266 1924.
21 Dustin, P Jr Symp of Soc Exp Biol No 1 114 1947
22. Zwejbaum J., and Glowiczower H Act. Neerland. Morph., v 4 No 3 1941
23. Chlopin N Izw Biol Nauez Isledow Inst. Permskow Univ., 3 187 1924 (Russian)
24. Schöne G Die heteroplastische und Homöplastische Transplantation. Julius Springer Berlin 1912.
25. Mayeda T Deutsche Zeitschr f Chir 167 295 1921
26 Burnet, F M., Stone, J D and Edney M Australian J Exp Biol. and Med Sc., 28 291 1950
27 Billingham R. E., Brent, L., and Medawar P B Nature 172 603 1953
28 Billingham, R. E., Brent, L and Medawar P B *Ann N Y Acad Sc., 59 409 1955.*
29 Weber R. A., Cannon J A., and Longmire, W P Ann Surg., 139 473 1954
30 Bürger M Altern and Krankheit, Leipzig, 1954
31 Lopashov G W., and Strojeva, O G Uspechi Sowrem Biol., 30 234 1950 (Russian)
32. Kosjakov P H The antigenic substances *of the organism and their importance in biology* and medicine Medgiz Moscow 1954 (Russian)
33 Billingham R. E and Boswell T Proc Roy Soc London B 141 392 1953
34 Maumenee A. E. Ann N Y Acad Sc., 59 453 1955
35 Billingham R. E and Boswell T s. pos. 33
36 Saltykow S Arch f Entwicklungsmech., 9 329 1900
37 Burian, F and Soraluce, J A On the alterations in the grafted rib cartilage Casopis lekaru ceskych, No 26 1937 (Czechoslovakia)
38. Medawar P B J Anat. London, 79 157 1945
39 Medawar P B Preservation and transplantation of normal tissues. A Ciba Foundation Symposium J and A Churchill Ltd., London, 1954 (General Problems of Immunity p 1)
40 Kostek T On the possibility of the use of frozen ox cartilage in plastic surgery of the face Otolaryngologia Polska 8 219 1954 (Polish)

Une Etude sur la Viabilité et le Comportement des Greffes de Cartilage Osseux chez l'Animal. TADEUSZ KOSTEK.

Des auto des homo et des hétérogreffes de cartilage costal ont été pratiquées chez les rats. On a utilisé du cartilage provenant d'animaux agés de 5 jours pour les homo et les hétérogreffes. On peut considérer ce matériau comme étant du type embryonnaire. La coloration vitale par du rouge neutre constitue une méthode biologique simple et rapide qui s est montrée un critère valable de la vitalité cellulaire Les homogreffes se trouvaient encore vivantes 288 jours après la transplantation. *Dans tous les cas les hétérogreffes avaient fini par* mourir au bout du 130e jour On peut donc supposer que les homogreffes de cartilage utilisé ont nettement survécu. La réaction à cellule mononucléaire du tissu environnant connue sous le nom de réaction immunologique de l'hote n'exerce pas un effet nocif sur la greffe cartilagineuse Il est possible que la deuxième loi relative à la transplantation ne soit pas valable quand il s agit de cartilage embryonnaire Il serait nécessaire d étudier la possibilité d'utilisation d'homogreffes cartilagineuses du type embryonnairé pour induire unt tolérance tissulaire Le défaut de vascularisation du *tissu cartilagineux n explique pas son* long temps de survie

plants have been made but a considerable time must elapse before the results are known and the eventual fate of human homograft cartilage is decided

The storage of cartilage in a viable state If human cartilage homografts survive for a sufficiently long time, as would now appear possible, cartilage banks would be of considerable practical value We are therefore studying the survival time of cartilage when stored at various temperatures and in various media The results so far are summarised in Table 2 and are very similar to those obtained in similar studies with skin (Pepper 1953)

REFERENCES

1 Backdahl, M, Consiglio, V, and Falconer, B Brit J Plast Surg, 7 263, 1954
2 Bywaters, E G L J Path Bact, Lond, 44 247, 1937
3 Curran, R C, and Gibson, T In Press, 1955
4 Dupertuis, S M Arch Surg, 43 32, 1941
5 Gibson, T, Curran, R C, and Kennedy, J S Transpl Bull, 2 44, 1955
6 Gillies, H Rev Chir struct, 3 169, 1937
7 Pepper, F J Brit J Plast Surg, 6 250, 1954

"East Brae," Potterhill Avenue,
Paisley, Scotland

Un Test in Vitro pour Eprouver la Vitalité du Cartilage Adulte Humain; son Application au Probleme de Greffe et de Stockage de Cartilage. THOMAS GIBSON ET ROBERT C CURRAN

Quand des fragments de cartilage vivant sont mis en incubation dans de la solution de Tyrode dont le radical sulfate contient S_{35}, les chondrocytes fixent le sulfate marqué et celui-ci peut être retrouvé après fixation à l'aide de l'autoradiographie Le cartilage mort ne réagit pas Ce test s'est montré utile dans les études suivantes

1 Comportement de l'autogreffe cartilagineuse humaine
2 Survie des homogreffes de cartilage humain
3 Stockage du cartilage dans des conditions viables aux fins d'homogreffe.

On rapporte le résultat préliminaire de cette étude

Ein in Vitro-Vitalitatstest von Menschlichem Erwachsenenknorpel, seine Anwendung auf die Probleme der Knorpel-Transplantation und—Aufbewahrung. THOMAS GIBSON UND ROBERT C CURRAN

Wenn lebende Knorpelstucke in Tyrode-Losung, deren Schwefelradikal S_{35} enthalt, im Warmeschrank aufbewahrt werden, so nehmen die Chondrozyten das markierte Schwefel auf und dieses kann nach Fixation mittels des Autoradiographen nachgewiesen werden Toter Knorpel zeigt keine Reaktion Dieser Test hat sich in den folgenden Untersuchungen als von grossem Wert erwiesen

1 Das Verhalten von menschlichen Knorpel-Autotransplantaten
2 Das Überleben von menschlichen Knorpel-Homotransplantaten
3 Die Aufbewahrung von Knorpel in lebensfahigem Zustand fur den Gebrauch als Homotransplantat

Vorlaufige Berichte uber die Ergebnisse dieser Untersuchungen werden gegeben

Una Prueba in Vitro para la Vitalidad del Cartilago Humano Adulto su Aplicacion a los Problemas de Injerto y Conservacion de Cartilagos. THOMAS GIBSON Y ROBERT C CURRAN

Cuando se colocan piezas de cartílago vivo, en solución de Tyrode, el radical sulfato, que contiene S 35, los condrocitos toman el sulfato liberado y esto puede ser demostrado despues de la fijación por medio de autoradiografías El cartílago muerto no muestra ninguna reacción Esta prueba ha demostrado ser de gran valor, en los siguientes estudio

1 La conducta a seguir en los injertos cartilaginosos humanes, autógenos
2 La supervivencia de los injertos homologos cartilaginosos
3 La conservación de cartílago en condiciones viablespara usar como homotransplantes

Se dan los reportes preliminares sobre el resultado de estos estudios

TABLE 2 SURVIVAL TIMES OF STORED CARTILAGE

Storage temperature	Storage medium	Survival time (days)
37°C	Tyrode's solution	4
37°C	Plasma	2
4°C	Moist saline swab (Thin slices)	14
4°C	Moist saline swab (Large block)	28
4°C	Tyrode's solution	40
−25°C	—	0
−70°C	CO_2 snow	0
−70°C after glycerol pretreatment	CO_2 snow	0

DISCUSSION

DR TADEUSZ KOSTEK

Dr Ostrowski and I have done some experimental work concerning the vitality of cartilage subjected to low temperatures The results obtained do not entirely confirm those demonstrated here and obtained by measuring the

Because of the wide separation of the cartilage cells a positive result is easily read. Bursts of activity *are located over the chondrocytes* and the radiations appear to emanate almost entirely from the cytoplasm of the cells. Because of "scatter" it is difficult to be certain that some of the isotope is not located in the matrix immediately adjoining the cell but apart from this there is no fixation of the isotope by the matrix itself

This is prima facie evidence that the uptake of S_{35} is a vital function of the cell and this conclusion is confirmed by the following observations.

1 220 samples of fresh human cartilage removed at operation from rib ear or nose have been examined and without exception all have given a positive result.

2. There is no uptake of S_{35} when the cartilage has been (a) boiled (b) fixed in alcohol formalin or cold acetone or (c) frozen below 0 C

3 If the specimen is incubated at 4 C instead of 37 C there is no uptake of sulphur but if it is later incubated at 37°C fixation of the ion occurs

4 Negative results are obtained when the specimen is incubated in the presence of certain enzyme inhibitors such as mersalyl (which inhibits enzymes of the SH type) or malonate (which inhibits succinic dehydrogenase)

5 If a piece of cartilage is stored under aseptic conditions and sampled at intervals a series of positive results is first obtained followed by a series of persistently negative findings

The physiological implications of this reaction are beyond the scope of this paper but it is considered that the sulphur is metabolised through the agency of an enzyme of the SH type and that the enzyme involved does not survive the death of the cell In other words the test is a reliable method of determining the life or death of cartilage cells

The Application of the Test

There are many possible applications of this test to problems of cartilage physiology pathology and transplantation Time permits, however only a brief summary of the preliminary results obtained in applying the test to studies of autograft behaviour homograft behaviour and the storage of cartilage in a viable state.

Autograft Cartilage Human cartilage autografts behave so unpredictably that they are seldom used in reconstructive work. They may persist apparently unchanged but some absorb completely and many become so warped and distorted that they have to be removed Thus the first fundamental point was whether cartilage grafts were capable of surviving as living entities or whether they persisted merely as inert structures This question was answered quite dramatically by a specimen recently sent to us by Sir Harold Gillies This was a piece of cartilage which he had "stored beneath the patient's abdominal skin in 1918 and found an opportunity to remove 37 years later The cartilage cells showed perfectly normal activity In addition biopsy specimens of 9 cartilage autografts removed at intervals of 2 24 months after insertion have all shown normal uptake of S_{35} The presence or absence of perichondrium on the surface of the graft did not affect the result. It would seem therefore that cartilage autografts "take" readily and are capable of life-long survival

Homograft Cartilage The work of Dupertuis (1941) has shown that in the rabbit, cartilage homografts will survive for a very long time. In man the evidence is not so clear Apart from the maternal ear cartilage grafts introduced by Sir Harold Gillies (1937) human homografts have been but little used and Bäckdahl and his colleagues (1954) reported a considerable degree of degenerative change in some of these grafts. We have now made 7 experimental homografts in human volunteers and examined these at varying intervals after insertion (Table 1) All have shown normal activity The longest survival period so far observed is 7 months a period greatly in excess of the survival time for homografts of other tissues other experimental im-

Table 1 Uptake of S_{35} by Human Homograft Cartilage

Duration of graft in tissues	Result
2 weeks	Positive
3 months	Positive
3 months	Positive
4 months	Positive
4 months	Positive
7 months	Positive

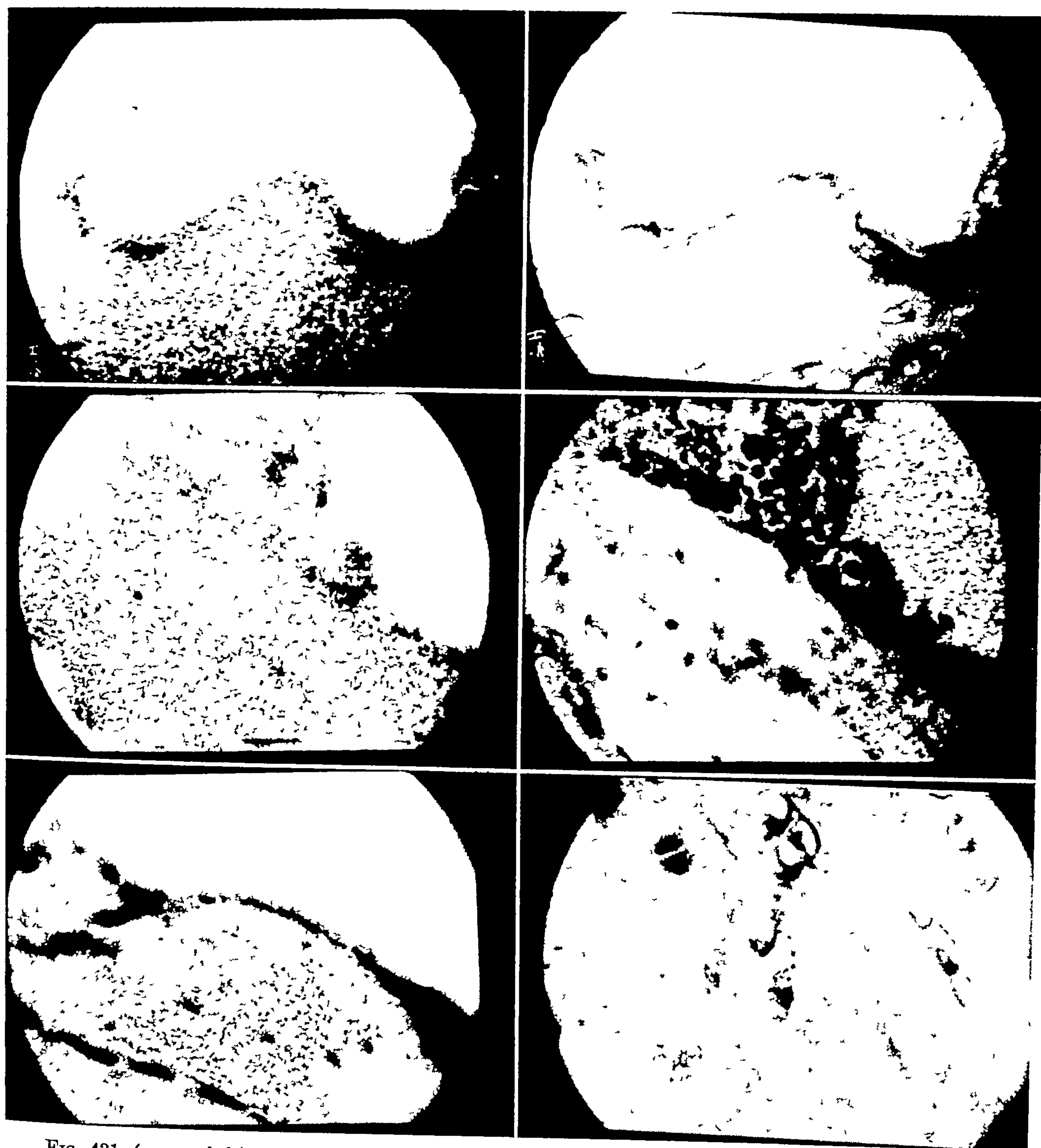


FIG 431 (upper left) Homograft of bone implanted subcutaneously for five days, in a porous chamber shows uptake of P^{32} autoradiographically (Upper right) Phase contrast section at cellular level for comparison with Fig 1, showing where the greatest distribution of P^{32} is found (Center left) Radioautograph of a two month homograft of bone showing uptake of P^{32} (Center right) Phase contrast view showing cellular level of Fig 3 when compared shows dense uptake over osteocytes and marrow (Bottom left) A radioautograph of a homograft of bone which has been in a chamber for three months, showing uptake of P^{32} (Bottom right) A homograft of bone which has been in a porous chamber four months, shows intracellular uptake of P^{32}

uptake of radioactive sulfur We have found that in a cartilage preserved under appropriate conditions at −30 C approximately 1-4 per cent of the cells retain their vitality while at a temperature of −79 C approximately 4-10 per cent of the cells remain alive In another series of experiments carried out by myself and concerning the lyophilisation of cartilage tissue I found *that at a temperature of −196 (liquid air) cells* remain alive only sporadically As a vitality test the method of vital staining has been used It is felt that this method may be more precise and sensible than other methods used as criteria of cartilage vitality

ul Wiejska 15 m 11
Warszawa Poland

The Uptake of Radiophosphorous by Bone Homografts in Diffusion Chambers. CLIFFORD L. KIEHN, M D, JAMES GUTENTAG, M. D *Department of Surgery Plastic Section Western Reserve University, Cleveland, Ohio*

Algire has shown by the use of the porous filter technique that homografts of tumors will survive indefinitely in the host.[1] The chamber which he devised containing the transplant allows the passage of metabolites for the nutrition of the graft through the porous walls The caliber of the pores however does not allow the passage of blood vessels or host cells This method therefore blocks the transmission of leucocytes macrophages and lymphocytes, which presumably carry the antibodies that would destroy the homograft if allowed to come in contact with the transplanted tissue He has further shown that homografts will survive in porous filters even if placed subcutaneously in previously immunized animals.

The existence of a transplant is dependent upon its ability to metabolize certain chemicals offered it. These chemicals when tagged and given the animal intravenously can be traced into the cells by the autoradiographic technique [2] When this was applied to autotransplants of bone P^{32} could be demonstrated in the cells as early as five days [3]

When the same technique is applied to homografts of bone metabolic survival could not be demonstrated at any time. The osteocytes are presumably destroyed by the antibodies produced by the host

In this series of experiments homografts of bone were placed in millipore filter chambers and buried subcutaneously and intraperitoneally The host was given radiophosphorus subcutaneously The grafts were then removed at intervals from their chambers and processed according to the Pelc technique which revealed the distribution of the radiophosphorus.

A homograft of bone that was removed from the chamber five days after implantation reveals an uptake of P^{32} in Fig 431 (upper left) When this section is compared to the upper right, which was photographed at the cellular level it shows that the P^{32} is distributed more densely along the edge of the trabecula where a large proportion of osteocytes is located

The radioautograph in center left shows the distribution of P^{32} in a homograft of bone that has been in a chamber for two months. The phase contrast view of the same section, center right shows cells in the lacunae and along the trabecula When compared with center left, a greater concentration of the isotope can be seen over the osteocytes and bone marrow

Another homograft of bone that has been in a chamber for three months and shows the distribution of P^{32} is seen in bottom left. A four month homograft of bone which is shown in bottom right reveals intracellular distribution of P^{32} in the radioautograph.

DISCUSSION

The theory that homografts are destroyed by antibodies produced by an immunological response of the host is generally accepted. If this is true there are several ways that homografts may be kept alive experimentally Grafts may be altered to adapt themselves to the host to prevent the host from recognizing the antigen after it has been produced, cause the failure of the production of antibodies or lastly prevent the antibody from reaching the graft.[4] With the development of the ingenious device by Algire a porous barrier does not allow the passage of the constituents of blood that probably carry the antibodies which will destroy the graft. There is a free interchange of tissue fluid containing metabolites through the millipore barrier which insures cellular survival. When

a los 10 días Los homoinjertos no "toman" los isótopos y pueden ser considerados desvitalizados

Cuando los transplantes tisulares son preparados para iniciar su revascularización por medio de una cámara, "toman" los isotopos realmente del fluido tisular Cuando los homoinjertos son colocados en la cámara "toman" tambien el P_{32}, mientras que no lo hacen cuando estan en contacto con la corriente sanguínea Esto probablemente puede explicarse por la falla del homoinjerto para producir una respuesta inmunológica, reteniendo en cambio su vitalidad cuando esta en la cámara del filtro Pensamos que esta técnica es un medio excelente para estudiar la vitalidad y los procesos metabólicos del injerto óseo, aotógeno u homólogo, por lo tanto la describimos en detalle

---

Biophysical Studies on Bone Transplants (A Preliminary Report). KAJ E H HOLMSTRAND, Dr, *Serafimerlasarettet, Stockholm, Sweden*

Report is given on the results from a preliminary study of homogenous and autogenous bone transplants to rabbit tibia Circular transplants fitted in with their longitudinal orientation turned 90 degrees are examined by microradiography at different healing times whereby the distribution of mineral salts in the ground bone sections is studied Micro X-ray diffraction shows the preferential orientation of the hydroxyapatite crystallites The ground sections were decalcified and examined in polarized light giving the orientation of the organic fibrillae Radioautography was used to show the distribution of Sr^{90} The findings are discussed

Etudes Biophysiques des Greffes Osseuses (Rapport Preliminaire). KAJ E H HOLMSTRAND

Compte-rendu des résultats d'une étude préliminaire des greffes osseuses homogènes et autogènes sur le tibia du lapin

Des greffons circulaires adaptés à leur orientation longitudinale et soumis à une rotation de 90° ont été examinés à la microradiographie à divers moments de la cicatrisation, ce qui a permis l'étude de la répartition des sels minéraux dans les sections osseuses à la meule La microdiffraction aux rayons X montre l'orientation préférentielle des cristaux d'hydroxyapatite Les sections à la meule ont été décalcifiées et examinées à la lumière polarisé de façon à se rendre compte de l'orientation des fibrilles organiques On a utilisé la radioautographie pour apprécier la répartition de Sr^{90} On discute les résultats obtenus

Biophysikalische Studien an Knochentransplantaten (ein Vorlaufiger Bericht). KAJ E H HOLMSTRAND

Es wird ein Bericht uber die vorlaufigen Untersuchungsergebnisse an homologen und autogenen Knochentransplantaten in die Kaninchentibia gegeben Zirkulare Transplantate, die mit einer Langsachse um 90° gedreht, eingefugt wurden, wurden mittels der Mikro-Rontgenfotografie wahrend verschiedener Heilungsstadien untersucht, wobei die Verteilung der Mineralsalze im Knochentransplantatbett untersucht wurde Mikro-Rontgen-Spektroskopie zeigt die bevorzugte Lagerung der Hydroxylapatit-Kristalle Die Knochenschliffe wurden entkalkt und durch Untersuchung in polarisiertem Licht die Richtung der Organfibrillen festgestellt Radioautographie wurde angewandt, um die Verteilung von Sr 90 zu zeigen Die Befunde werden besprochen

Estudios Biofisicos de Trasplantes Oseos (Reporte Preliminar). KAJ E H HOLMSTRAND

P^{32} is added to the metabolic pool the surviving cells utilize it and distribute it probably in a *combination with calcium and bone apatite* crystals. The deposition of the P^{32} is clearly demonstrated in the radioautographs and indicates survival of the homograft under certain conditions

The porous filter chamber of Algire is another research tool which will allow comparative studies of transplants and with the use of isotopes the metabolic requirements of the transplanted cell can be determined.

CONCLUSIONS

1 Homografts of bone when implanted in porous chambers subcutaneously and intraperitoneally remain alive as demonstrated by their ability to metabolize P^{32}

2. They retain their viability when protected from the host defenses to antigen by the millipore barrier which allows the free interchange of metabolites but probably prevents the antibody transport which destroys homografts

REFERENCES

1 Algire G J Nat Cancer Inst., 15 493-507 1954
2. Doniach L and Pelc S R Brit. J Radiol 23 184 1950
3 Kiehn, C L and Gutentag, J Plastic and Reconstructive Surgery 14 425-430 1954.
4. Prehn, R T *Personal Communication*

10605 Chester Avenue
Cleveland 6 Ohio

La Fixation l Isotopes Radioactifs par les Greffons de Culture de Tissu in Vivo CLIFFORD L KIEHN

Dans des rapports précédents l auteur a montré que les greffons tissulaires métabolisaient de façon très précoce les isotopes radioactifs dans leur nouveau milieu L auteur pense que cela indique leur viabilité et démontre que l os autogène commence à métaboliser le P32 dans les 5 jours A l'aide d une technique radioautographique il a été capable de montrer la répartition des isotopes à l'intérieur des cellules. Quand on utilise des greffes osseuses autogènes, le P32 peut être trouvé dans l'intérieur des cellules dès le 10e jour Les homogreffes d os ne fixent pas du tout les isotopes et on peut vraisemblablement les considérer comme dévitaliser

Quand on empêche la revascularisation des greffons tissulaires à l aide d'une chambre ils absorbent rapidement les isotopes à partir du liquide tissulaire Quand on place des homogreffes dans la chambre elles fixeront du P32 mais ne le feront pas par contre si elles sont encontact avec le courant sanguin. On peut probablement expliquer ce fait par l'incapacité de l'homogreffe à produire une réaction immunologique et partant à conserver sa viabilité quand elle est maintenue dans le chambre à filtre milliporique L auteur pense que cette technique est un excellent instrument pour étudier la viabilité et les processus métaboliques des auto *et des homogreffes osseuses et c est pourquoi* il on fera la description détaillée

Die Aufnahme Radioaktiver Isotopen durch Gewebekulturtransplantate in Vivo CLIFFORD L. KIEHN

In früheren Mitteilungen haben wir gezeigt dass Gewebetransplantate in ihrer neuen Umgebung radioaktive Isotope sehr frühzeitig verarbeiten Wir glauben dass dies ein Zeichen ihrer Lebensfähigkeit ist und ein Beweis dafür daß autogener Knochen P^{32} innerhalb von 5 Tagen umzusetzen beginnt Mit dem Gebrauch der Radioautographie ist es uns gelungen, die intra *celluläre Verteilung von Isotopen nachzuweisen.* Wenn autogene Knochentransplantate gebraucht werden, kann P^{32} schon am 10 Tage in den Zellen erkannt werden. Homotransplantate von Knochen nehmen die Isotope überhaupt nicht auf und können als devital angesehen werden. Wenn Gewebstransplantate mittels einer Kammer daran behindert werden sich zu revascularisieren, so nehmen sie die Isotope ohne Schwierigkeit aus der Gewebeflüssigkeit auf Homotransplantate in eine Kammer gebracht nehmen P^{32} auf während sie *dies nicht tun, wenn sie in Berührung mit* dem Blutstrom sind. Dieses kann wahrscheinlich damit erklärt werden, dass das Homotransplantat keine immunologischen Reaktionen produziert und daher seine Lebensfähigkeit bewahrt wenn es in einer milliporen Filterkammer gehalten wird. Wir denken, dass diese Technik ein ausgezeichnetes Mittel zum Studium der Lebensfähigkeit und der Stoffwechselprozesse *der Auto- und Homotrans-*plantate des Knochens ist und es wird ausführlich beschrieben

La "Toma" de Isotopos Radioactivos en Cultivos de Tejidos. CLIFFORD L KIEHN

En comunicaciones anteriores hemos demostrado que *los transplantes tisulares pueden metabolizar* los isótopos radioactivos rápidamente en su lecho receptor Creémos que ésto es una indicación de su vitalidad y demostramos que el hueso autógeno empieza a metabolizar P_{32} *a los cinco días. Por* medio de las técnicas autorradiográficas hemos podido demostrar la distribución del isótopo dentro de las células. Cuando se ha usado injerto de hueso autógeno se puede ver *el* P_{32} *en* la célula

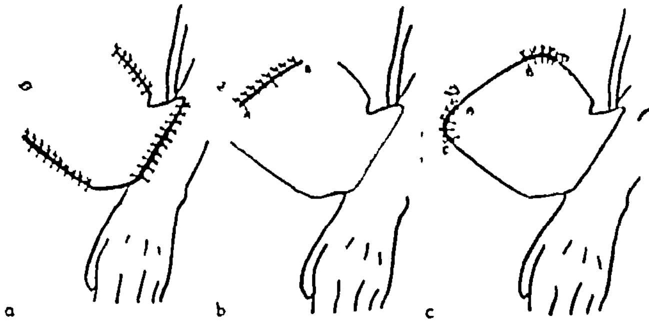


FIG 432a *1st stage* Flap raised and attached to forearm Partly resutured to abdomen b *2nd stage at 16th day* Base of flap incised from A to B Flap completely undermined Incision A to B resutured c *3rd stage at 23rd day* Incisions AC and BD to complete division of base of flap
4th stage at 29th day Flap transferred to chest *5th stage at 50th day* Flap detached from wrist

Furthermore, if there is any difficulty in immobilisation and excessive tension occurs, the results are far less likely to be disastrous than with the limited attachment of a tubed pedicle

The author's technique for the open jump flap is shown in diagrams (Fig 432) prepared from an actual case (Fig 433) The operation was completed in 5 stages, the total time in hospital being $8\frac{1}{2}$ weeks

The same technique was used throughout the series with only minor variations in design and time intervals

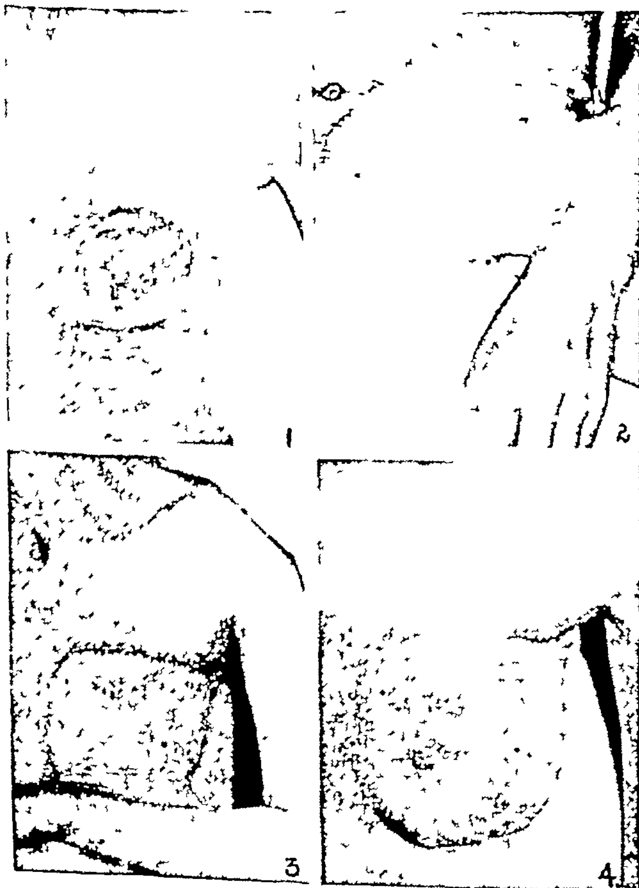


FIG 433 Female Aged 46 Radio necrosis of chest wall with exposure of pericardium

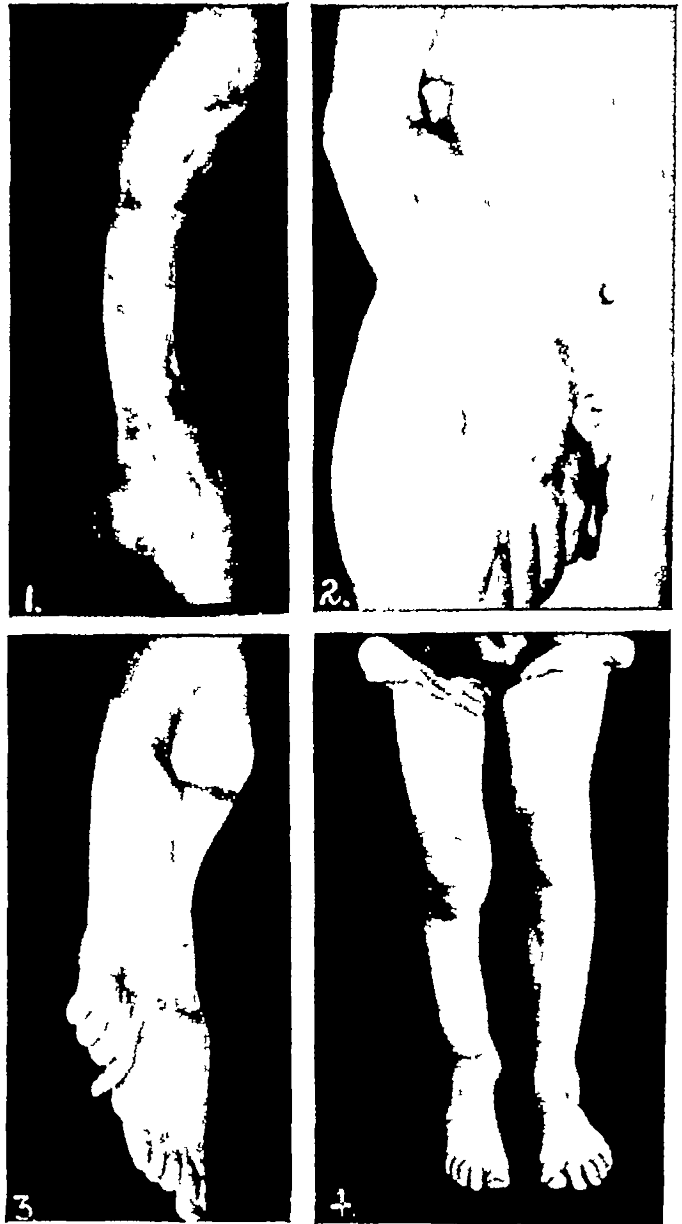


FIG 434 Male Aged 14 Circumferential skin loss right leg with un-united fracture of tibia as the result of a road accident Union of the tibia occurred after replacement of the right unstable scar tissue by a very large abdominal flap

Le Tracé des Lambeaux pour les Grandes Réparations La Méthode du Lambeau Cruenté à Distance. PERCY H JAYES

L'auteur discute des difficultés et des limites du lambeau tubulé pédiculé et expose les avantages du lambeau cruenté à distance pour un certain nombre de grandes réparations chirurgicales qu'il énumère Il donne les détails pour le tracé du lambeau cruenté à distance et expose une méthode

XIII

FLAP REPAIRS, MYELOMENINGOCELE, LYMPHOEDEMA, DERMAL ABRASION, MISCELLANEOUS

A Flap Repairs

The Design of Flaps for Major Repairs —The Open Jump Method PERCY H JAYES, M B B S, F R C S *The Queen Victoria Hospital, Plastic Surgery and Jaw Injuries Centre, East Grinstead Sussex England*

The repair of large skin defects often necessitates the transference of a flap from a distant site and the purpose of this paper is to indicate the advantages of the open jump flap over the tubed pedicle procedure

The tube is very ingenious and it holds an honoured place in the development of plastic surgery but in the vast majority of patients it is no longer the method of choice. Sentiment and tradition alone seem to be responsible for its use in many cases which could be more quickly and safely repaired by the open jump method

Safety and reliability are of prime importance in transferring large flaps of skin and the open jump method displays these qualities to a remarkable degree The flap has a broad attachment at each stage of the repair and its blood supply very rarely causes anxiety

In a personal series of 20 cases significant loss of skin has not occurred but a marginal loss up to 3 cm in width has been seen on several occasions without jeopardising the final success of the repair or increasing the time involved.

In the tubed pedicle method the actual attachment of the pedicle is usually small in relation to the total area of the flap and massive necrosis is by no means unknown. The second important point in considering the relative merits of the two methods is the length of time required to complete the repair

Theoretically it is possible to carry out a tubed pedicle repair within 3 months and the work of Hynes and others on the vascular supply of pedicles has helped to reduce the interval between stages Nevertheless there seems to be a great discrepancy between the theoretical time required and the prolonged period which many of these patients spend in hospital.

The reasons for delay are numerous and difficult to avoid even with great care and experience. For example a small loss of skin which would be of no significance when using an open flap with a broad attachment is likely to render the limited insertion of a tube ineffective. It is then necessary to increase the interval between stages or to reinsert the pedicle with further loss of time. Again a small haematoma in a tube will sometimes impede its blood supply and cause a delay

The open flap has been used successfully for very large defects which would be exceedingly difficult to cover with a single tube and the use of two or more tubes in these cases would inevitably increase the time and the risk of complications

Secondary operations are often necessary to respread tubed flaps but when skin is supplied initially as a flat sheet it is much easier to obtain smooth distribution and secondary operations are rarely required

The protagonists of the tube pedicle claim that the open flap carries a greater risk of infection but since the introduction of antibiotic drugs this risk is negligible. Greater mobility is also claimed for the tubed pedicle but with careful planning the patient undergoing an open flap repair is not submitted to greater discomfort

and foot The indications for its use are seldom those of election but rather those of necessity These procedures are most frequently employed where there is skin loss in association with post-traumatic disorders of bone or where it is necessary to provide a suitable surface for areas subjected to pressure or where free grafts have failed to provide adequate coverage It is more infrequent that these pedicles are indicated in peripheral vascular problems or simple surface defects such as those originating from thermal injury The contraindications to cross leg flaps are chiefly those concerned with age, joint changes, patient cooperation, suitability of the donor areas, the ability of the recipient site to accept the flap and the general condition of the patient

In planning the flaps in this series the primary pre-operative consideration was concerned with the selection of the donor site This was done by evaluating the skin for availability and suitability for transfer and the positions that could be tolerated best by the patient The direction of the flap, that is whether it was based proximally or distally, was determined by the location of the recipient site Proximally based flaps were usually used to resurface defects of the medial aspect of the recipient leg, while distally based flaps were generally best suited for the lateral surfaces Generally a ratio of width of flap to length of flap of 1 to 1½ was considered safe for a one stage procedure on the anterior thigh but flaps originating on the calf of the same proportion were usually delayed If the proportionate length needed was greater than the ratio of 1 to 1½ then preliminary delay of the outlined flap was done regardless of the direction of the base or the site of origin In estimating the size of the flap, allowance was made for shrinkage of the pedicle when it was cut free and the expansion of the skin defect when the cicatricial pull of the recipient site was released by incision Also allowance was made for the curve of the donor surface and for the bridge of tissue crossing between the two extremities Generally the pedicles were planned so that at least ⅓ of the flap surface was applied to the defect As for the recipient site, as much of it was covered by the flap initially, as the mechanics of position would permit Usually two-thirds or more of the tissue to be transferred was placed in its new bed at the time of the cross leg procedure

The donor areas used for the cross leg flaps in this series were the antero-lateral, anterior and antero-medial surfaces of the distal thigh and the posterior and medial aspects of the calf from the popliteal space distally to the musculo-tendinous portion of the gastrocnemius muscle If it was compatible with patient comfort and the distance to the lesion could be spanned with ease, the lower anterior or antero-lateral surface of the thigh was used, since delay in this area seldom was necessary even though a reverse flap was employed Anatomically, this region of the thigh presents adequate arterial and venous channels The anastomotic collateral system about the knee joint provides a fountain head of arterial blood The venous drainage is also adequate in these areas since the patellar region drains medially into the saphenous system and the antero-lateral thigh surface drains proximally to enter the saphenous system just below the sapheno-femoral junction Although it was not always done, grafts arising from the medial aspect of the thigh and based distally probably should be delayed prior to the time of application and the saphenous vein ligated at the base of the flap to prevent engorgement with venous blood If there was need to reduce flexion slightly, the thigh flaps were extended distally to the mid-patellar level A flap which originated in the lower leg was usually delayed prior to transfer regardless of length or direction of the pedicle

At operation, the defect to be grafted was excised well into normal tissue if the size of the lesion did not prohibit As far as possible, all scar and diseased tissue were removed Attempts were made to render the recipient wound surface flat or only slightly concave to prevent the establishment of dead space beneath the pedicle Prime emphasis was placed on hemostasis for hematoma could be the cause of pedicle loss After the recipient site was prepared, the recipient leg was crossed over to the selected donor site A pattern of towelling or other suitable material was then cut slightly larger than the defect to allow for contractibility of the flap Thus the flap was designed to fit the actual defect

The flaps consisted of skin and subcutaneous tissue, fascia was not included If desired, the

simple de transfert Une réparation de grande envergure peut être conduite à bien au bout de trois mois à l'aide de cette méthode et cela est à comparer avec le temps beaucoup plus long qui est souvent nécessaire avec le procédé à lambeau tubulé pédiculé Présentation d'une série de cas dans lesquels on a transféré de très grandes zones de peau par la méthode du lambeau cruenté à distance pour réparer une grande variété de perte de substance

On signale qu'en dehors du temps qu'elle épargne cette méthode procure une plus grande sécurité et est beaucoup moins grevée de complications que la méthode do lambeau tubulé

Die Form von Lappen bei Grösseren Wiederherstellungsoperationen Die offene Wanderlappenmethode PERCY H JAYES

Die Schwierigkeiten und Grenzen des Rundstiellappens werden diskutiert und die Vorteile des offenen Wanderlappens für grössere Wiederherstellung aufgezählt Einzelheiten der Methode des offenen Wanderlappens werden gegeben und eine einfache Methode der Lappenvorbereitung in situ durch schnittweises Umschneiden und Ablösen wird illustriert Eine grössere Plastik kann in weniger als 3 Monaten mit diesen Methode ausgeführt werden im Vergleich zu der viel längeren Zeit die häufig für ein Rundstiellappenverfahren erforderlich ist Eine Serie von Fällen, in denen sehr grosse Hautbezirke mit der Wanderlappen Methode zur Deckung verschiedenartiger Defekte gebraucht wurden wird vorgeführt

Es wird die Meinung vertreten dass neben der Zeitersparnis mit dieser Methode eine grossere Sicherheit und weniger Komplikationen verbunden sind als mit dem Rundstiellappen.





FIG. 435 Male Aged 21 Extensive scarring of both legs with deformity of feet resulting from a burn at the age of seven years. Each leg was covered with a large abdominal flap and the dislocated toes amputated. Excellent functional result.

Proyecto de Colgajos para Reparaciones Mayores. El Metodo Del Colgajo Migratorio Abierto. PERCY H JAYES

Se discuten las dificultades y limitaciones del colgajo tubular y se ennumeran las ventajas del colgajo migratorio abierto para las reparaciones mayores. Se dan detalles para el proyecto de colgajo migratorio abierto y se ilustra un método simple de demora Una reparación mayor puede completarse en menos de tres meses por este método en comparación con el tiempo mas largo que se necesita al usar el colgajo tubular Se presenta una serie de casos en los cuales se han trasladado areas de piel grandes por el método de colgajo migratorio abierto para la reparación de una gran variedad de defectos.

Ademas de ahorrar tiempo este método dá seguridad y evita las complicaciones que se presentan con el colgajo tubular

---

Evaluation of 114 Cross Leg Flaps.

WILLIAM L WHITE, M D S M DUPERTUIS M D J C GAISFORD M D., ROSS H MUSGRAVE, M D AND DWIGHT C HANNA M D, *University of Pittsburgh Pittsburgh 13, Pa*

This report is concerned with the analysis of the end results of 114 cross leg flaps All of these procedures have been done in the past 15 years as a cumulative experience of the authors Ninety four of these pedicles originated on the lower anterior thigh surfaces while only 20 were based below the knee In this series the use of thigh skin for the creation of flaps appears to be time saving and reduces the number of operative stages required to effect tissue transfer This is attributed to the excellence of the collateral arterial blood supply about the knee joint and the adequacy of the venous drainage in this region

The cross leg flap is an accepted method for resurfacing cutaneous defects of the leg ankle

directed to complaints of pressure points Pain was expected to be troublesome during the first five to seven days and narcotics were given freely Subsequently, there was only moderate discomfort, if the immobilization was rigid During the time of cross leg fixation, patients usually lost about 15 lbs in weight but seldom displayed other evidence of physiologic disturbance

The time of separation was decided empirically but was seldom done before the 21st day None of the various methods that have been described for evaluation of viability were employed If the pedicle had been blanched throughout, the position was usually maintained a few days longer If there was concern about the blood supply to the flap, the base was partially divided and final separation done two to four days later If the flap was cyanotic throughout, it was treated similarly However, if it was slightly cyanotic at first and later appeared clear and pink, it was separated on the 21st day This was regarded as a good omen, for a pedicle that was cyanotic and later became pink while in position had demonstrated that it was utilizing the blood supply from the surface to which it had been applied

At the time of separation, the pedicle was divided near its origin to leave a generous flap for closure or revision of the surface defect It is unforgivable to cut the flap too short to permit closure of the defect being resurfaced The protruding flap edges were undermined to excise granulation tissue and covering free graft and the recipient beds prepared similarly to receive the flap ends Since these areas were usually contaminated, closure was loosely accomplished with a few interrupted sutures Rubber tissue drains were used routinely under the edges of both the donor and grafted areas These drains were removed within 48 hours

Usually by the time the edges of the flap had healed, the patients had re-established good joint movement They often became ambulatory by the 7th to the 10th day after separation, if the bony parts would permit

The following evaluation of end results will not permit critical analysis due to the small number of cases anl the degree of variation encountered However, this series of cases does represent a fairly uniform experience from the standpoint of technique since they were all done on one plastic surgery service

Results

In this series of 114 cross leg flaps, 38 patients obtained excellent end results, 42 good results, 12 fair results, while 22 were considered failures By definition, an excellent result is one in which there was no significant loss of tissue and healing of the flap provided the desired coverage Good results include those in which only slight tissue loss might have occurred, where tissue was not quite adequate and where coverage was not completely satisfactory Fair end results were those in which the pedicle was sufficient to heal the defect but did not provide the amount or type of coverage desired Failures include those in which the intended objective was not attained due to a loss of more than 20 per cent of the flap application

Follow up

The follow up contacts varied from one month to 10½ years Approximately half of the patients were followed over a period of 2 years

Follow Up	Excellent	Good	Fair	Failures
1-3 Mo	3	2		2
3-6 Mo	4	8	2	3
½-1 Yr	2	9	3	1
1-2 Yrs	4	9	1	7
2-4 Yrs	15	11	2	5
4 Yrs plus	10	3	4	4
Totals	38	42	12	22

Age

The youngest patient was 12 years of age and obtained an excellent end result The oldest patient was 60 and is classified as a good result Seventy-six per cent of the patients were between 20 and 39 years of age Generally the patients over 40 tolerated the procedure poorly and presented a greater incidence of failure

Years	Excellent	Good	Fair	Failures	Per cent
10-19	4	1	1		5
20-29	10	18	8	7	38
30-39	17	16	3	7	38
40-49	5	3		3	9
50-59	2	3		5	9
60+		1			1
Totals	38	42	12	22	100

flap was thinned by removal of the excess fat, deep to the level of the superficial fascia. The area surrounding the donor defect was then undermined for approximately one inch in all directions and the skin edges rolled down and sutured to the fascia with interrupted non absorbable 000 to 0000 sutures the ends of which were left long This reduced the size of the donor defect somewhat and tended to flatten the wound. A free graft was then sutured into the donor defect and when possible was carried up on the base of the flap to cover or close the bridge portion of the pedicle. It was felt that there was less reaction and subsequent fibrosis of the flap when all raw surfaces were thus closed with free grafts. In most instances the grafted donor defect was then covered with fine mesh gauze and a fluff gauze dressing The long suture ends previously placed were tied over this dressing This technique insures even pressure on the graft regardless of the position of the limb and avoids the necessity for a constricting dressing about the extremity under the cast.

The flap was sutured into place in the recipient defect often using subcutaneous sutures of fine silk, cotton or catgut, all the while attempting to advance the pedicle into the defect with these sutures. In several cases this buried suture was not used Skin closure was accomplished with 5-0 silk sutures or #35 stainless steel wire Wire has the advantage of producing little reaction and if desired may be left in place until the pedicle is divided.

In this series the manner of fixation of the legs in the crossed position has changed from that of minimal plaster immobilization augmented by counter balanced pulley weights to one of complete plaster immobilization without aid of weight balance. Since the joints are subject to torsion and unnatural position it is believed that any degree of motion tends to increase the discomfort. An attempt was made to secure complete immobilization in a line extending from the hip of the involved limb to the ankle of the opposite limb This rigid fixation seemed to give greater comfort.

Prior to the application of plaster all bony prominences were carefully padded with felt, which was shaped to the part and the intervening skin was protected with sheet wadding. A folded towel was placed between the donor leg and the crossed leg to preserve space between them. This towel was later removed, leaving a space into which the crossed limb could sink with gravity without producing pressure Plaster immobilization was facilitated by means of plaster splints and wooden braces incorporated in plaster about both legs extending from midthighs down to and including both feet if needed. Stress was overcome and the crossed leg position was maintained by a system of struts which incorporated long strips of wood ¾ x ½" For rigidity these struts were primarily arranged to form three right angle triangles or isosceles triangles. With thigh flaps it was found useful to place a heavy pedestal strut under the elevated flexed knee to maintain balance and insure against movement of the hip on the affected side. Usually this pedestal was applied first and fixed by means of fast setting plaster since this relieved the assistant who maintained the position, of a great burden of weight A strut was then placed from the extended ankle to the flexed recipient knee and was fixed only at the donor ankle A third strut was then fixed to the ankle or foot of the involved leg and extended to the ankle of the donor leg. This too was fixed at only one end A fourth strut was often placed between the flexed knee and the thigh of the donor leg where it was attached. Finally while the limbs were held in the desired position, with slight exaggeration in the planes opposed to the static force all free ends of the cross bars were fixed in position by circular plaster Before the patient left the operating room the plaster was trimmed and polished thus allowing time for the cast to set. The application of the plaster fixation was always fraught with the danger of pulling on the pedicle or losing the neutral position. By leaving final fixation until the last, it was possible to obtain immobilization in the exact position desired. By means of an over head bar arrangement, a heavy counterbalanced rig of pulleys and weights was applied to the cast near its center of gravity to allow the patient help in changing his position in bed using the bedpan etc This merely supplied temporary buoyancy for movement for most patients preferred not to use this traction continuously

Postoperatively the flap was inspected several times each day and careful attention was

Calf					
Direct	3	2	1	5	(11)
Indirect		4			(4)
Transverse	3			2	(5)
					(20)

Plane of donor flaps

This study indicates that thigh flaps based on the antero-lateral surface of the thigh, produce better end results than those on the anterior surface, while the antero-medial aspect gave the poorest results This last category, however, includes most of the thigh tubes in which there was 40 per cent failure In the calf series, medially based flaps resulted in more failures than those based on the posterior aspect

PLANE OF DONOR FLAP

Thigh	Excellent	Good	Fair	Failures	Totals
A L	20	19	5	3	(47)
Ant	9	14	3	4	(30)
A M	3	3	3	8	(17)
Calf					
Med	3	2		5	(10)
P M	2	2	1	1	(6)
Post	1	2		1	(4)
Totals	38	42	12	22	

Donor site to recipient site

The exchange of tissue from donor site to recipient site has followed all possible combinations Stark [2] has stated that thigh flaps will surface the ankle and leg comfortably It has been found that these flaps are also quite suitable for application to the foot However, the predominant number of thigh flaps were applied more proximally while the predominance of calf flaps were applied to the ankle and foot

DONOR SITE TO RECIPIENT SITE

	Excellent	Good	Fair	Failures	Totals
Thigh to leg	11	21	5	12	(49)
Thigh to ankle	6	5	1		(12)
Thigh to heel	11	3	2	1	(17)
Thigh to foot	4	7	3	2	(16)
Calf to leg	2	2		3	(7)
Calf to ankle	1				(1)
Calf to heel	1	1		2	(4)
Calf to foot	2	3	1	2	(8)
Totals	38	42	12	22	(114)

Surface area of transplanted tissue

The smallest flap was 3 square inches and the largest 96 The former was an excellent result, while the latter gave only a fair result Ninety three of the flap applications measured between 5 and 39 square inches

Effect of delays

Among the 94 thigh flaps, 31 were delayed or 33 per cent, however, this included the 15 thigh tube flaps, all of which had preliminary delay procedures numbering from 2 to 5 If the tubed flaps were excluded then only 16 or 20 per cent of the remaining 79 thigh flaps were delayed Among the 20 calf flaps 80 per cent were delayed Of the 31 delayed thigh flaps, there were 7 failures or 23 per cent, while the 16 delayed calf flaps resulted in 5 failures or 31 per cent There were 63 non-delayed thigh flaps with 8 or 13 per cent failures, while among 4 calf flaps which were not delayed, half resulted in failure

Complications

All cross leg graft patients complain of pain but this varies in degree Only one patient was unable to tolerate the discomfort Infection occurred in 11 patients, phlebitis in 2, hematoma

SURFACE AREA OF TRANSPLANTED TISSUE

Square inches	Excellent T	Excellent C	Good T	Good C	Fair T	Fair C	Failures T	Failures C	Totals
Less than 5	2								(2)
5 to 9	6	1	8	2	2		3	2	(24)
10 to 19	13	4	18	4	6		3	2	(50)
20 to 29	5	1	5			1	4	3	(19)
30 to 39	2		3		1		1		(7)
40 to 49	3		2		1		1		(7)
50 to 59	1								(1)
60 plus					1		3		(4)

Sex

Males outnumbered females 104 to 10 There were 18 per cent failures in males and 30 per cent failures in females

	Excellent	Good	Fair	Failures
Male	32	41	12	19
Female	6	1		3
Totals	38	42	12	22

Stature

There was no significant difference in end results in relation to stature Patients were classified as tall medium, short and thin average and heavy There were a few more failures in thin individuals than those of average or heavy stature. Those who were tall or of average build did not do as well as the shorter patients. There seemed to be no relationship between weight height in this study It was expected that short heavy individuals would not do as well as others but this was not true.

Indications

Compound fractures and/or osteomyelitis with associated soft tissue defects accounted for two-thirds of the total number of cases The incidences of failure was greatest among these cases. *Roughly one-fourth of the patients* were subjected to the cross leg procedure for post-traumatic soft tissue defects Vascular lesions constituted the primary etiologic disorder in only 7 per cent.

Indications	Excellent	Good	Fair	Failures	Per cent
Compound frac and/or osteo	19	32	8	16	66
Traum. ulcers	18	4	4	5	27
Vascular ulcers	1	6		1	7
Totals	38	42	12	22	100

Status of recipient site—seventy-six per cent of recipient sites were unhealed at the time the flap graft was performed. In this group of 87 cases failures occurred in 18 or 21 per cent The healed lesions numbered 27 which included 4 failures or 15 per cent.

STATUS OF RECIPIENT SITE

	Excellent	Good	Fair	Failures	Per cent
Unhealed	28	32	9	18	76
Healed	10	10	3	4	24
Totals	38	42	12	22	100

Location of recipient site

The leg from the knee to the ankle presented the area most frequently treated by cross leg flaps and accounted for 56 cases or 49 per cent of the total. There were 15 failures in this group or 27 per cent There were 12 ankle lesions in which there were no failures. The heel and foot each accounted for about 20 per cent of the cases and the failure rate in each was approximately 15 per cent

RECIPIENT SITES

	Excellent	Good	Fair	Failures	Per cent
Leg	13	23	5	15	49
Ankle	6	5	1		11
Heel	13	4	2	3	19
Foot	6	10	4	4	21
Totals	38	42	12	22	100

Direction of flap base

Of the 94 thigh flaps 40 were based proximally There were 4 failures or 9 per cent in this group Indirect or distally based thigh flaps numbered 48 in which there were 23 per cent failures however this figure includes 15 large tubed thigh flaps in which the incidence of failure was 6 or 40 per cent. These results are not in keeping with the experience of others notably Macomber and Briele [1] Calf flaps based proximally numbered 11 in which there were 5 failures or 45 per cent. Four indirect calf flaps all resulted in good results Transverse calf flaps were 5 in number in which 2 failed or 40 per cent.

DIRECTION OF FLAP BASE

Thigh	Excellent	Good	Fair	Failures	Totals
Direct	22	14	6	4	(46)
Indirect	7	17	4	5	(33)
Indirect tube	3	5	1	6	(15)
					(94)

unexplained etiology accounted for 15 failures, ten of which were thigh flaps and 5 calf flaps The ten thrombosed thigh flaps included 5 that were tubed, and in each case included a large tissue mass This was unquestionably a significant factor in the development of thrombosis Loss of tissue in 5 thigh flaps was due to obvious mechanical faults such as torsion, pressure, stretch, etc Infection was the cause of loss in 2 calf flaps

Discussion

From this experience it appears that the thigh is a more suitable donor site for cross leg flaps than the lower leg It is not intended to condemn or abandon the use of calf flaps for on many occasions it offers the only suitable method for tissue transfer If it is a matter of choice this experience indicates that the thigh flap is preferable

The use of the anterior or antero-lateral thigh is facilitated by the unique anatomical arrangement of the vascular system of the part It has become apparent that this procedure lends itself to standardization of technique, reduces the number of operations for tissue transfer and provides a relatively comfortable position to maintain

The advantages of thigh flaps over calf flaps are

1 Fewer failures (in this series)
2 Fewer preliminary delays required (in this series)
3 Thigh skin is coarser
4 Relational anatomical hazards are less
5 Originate on the anterior aspect of the limb
6 Bigger flaps may be obtained
7 Length of flaps may be extended at separation or by delay
8 More flexion of recipient limb is required but there is less painful joint torsion
9 Plaster fixation is less complicated
10 Toilet care is less difficult
11 Dressings and inspection are simpler
12 Cosmetically better, especially for females

Summary

Among the 94 thigh flaps, there were 15 failures or 16 per cent Of the 15 tubed thigh flaps there were 6 failures or 40 per cent In the 79 thigh flaps not tubed, there were 9 failures or 11 per cent Among the 20 calf flaps there were 7 failures or 35 per cent

References

1 Macomber, W B, and Bricle, H A Modern experiences with tubed flaps of the thigh Plastic and Reconstructive Surgery, 2 163, 1947
2 Stark, R B The cross leg flap procedure Plastic and Reconstructive Surgery, 3 173, 1952

Une Appréciation de 114 Cas de Lambeaux Jambiers Croisés. WILLIAM L WHITE, S M DUPERTUIS, J C GAISFORD, ROSS H MUSGRAVE ET V HANNA

Des lambeaux jambiers croisés sont souvent necessaires pour la réparation de pertes de substances superficielles de la partie basse de la jambe, de la cheville et du cou On discute dans cet article la technique des lambeaux jambiers croisés et on fait une analyse de 114 cas Cette analyse tient compte des problèmes soulevés par le sexe, la taille, les indications, les lieux de réception, les lieux de prélèvement, la direction de la base, le plan anatomique, la surface, les délais, les complications, les décollements, l'examen suivi du malade et les échecs Cette appréciation fait ressortir que la cuisse constitue une zone donatrice plus convenable que le mollet pour les lambeaux jambiers croisés

Bewertung von 114 Gekreuzten Beinlappen. WILLIAM L WHITE, S M DUPERTUIS, J C GAISFORD, ROSS H MUSGRAVE UND V HANNA

Gekreuzte Lappen vom Bein werden haufig fur die Abdeckung von Oberflachendefekten des Unterschenkels, des Knochels und Fußes benotigt In diesem Bericht wird die Technik der gekreuzten Beinlappen besprochen und eine Analyse von 114 Fallen gemacht Diese Analyse umschließt Gesichtspunkte wie Geschlecht, Wuchs, Indikationen, die Einlagerungsstellen, Entnahmestellen, Richtung der Basis, anatomische Schicht, Bezirk, Lappenvorbereitung, Komplikationen, Durchschneidung, Nachuntersuchung und Mißerfolge In dieser Auswertung scheint es, daß der Oberschenkel eine geeignetere Entnahmestelle fur gekreuzte Beinlappen ist als die Wade

Evaluación de 114 Casos de Colgajo de "Pierna Cruzada." WILLIAM L WHITE, S M DUPERTUIS, J C GAISFORD, ROSS H MUSGRAVE Y V HANNA

Los colgajos de "pierna cruzada" son necesarios para la corrección de defectos de la superficie de

EFFECT OF PRELIMINARY DELAYS

	Excellent Y	Excellent N	Good Y	Good N	Fair Y	Fair N	Failures Y	Failures N	Totals Y	Totals N
Thigh direct	2	20	5	0	1	6		4	8	39
Thigh indirect	4	6	10	12	2	2	7	4	23	24
Calf direct	5	1	1	1	1		5	2	12	4
Calf indirect			4						4	
	11	27	20	22	4	8	12	10	(47)	(67)

94 thigh flaps—31 delayed or 33 per cent 15 Tubed thigh flaps—all delayed or 100 per cent 79 thigh flaps (not tubed)—16 delayed or 20 per cent 20 Calf flaps (not tubed)—16 delayed or 80 per cent.

in 3 psychosis in 1 and cast pressure in 20 In spite of the liberal use of padding, bed pressure was the source of pain in 11 of the 20

COMPLICATIONS

	Excellent	Good	Fair	Failures
None *	33	25	7	12
Infection		6	3	2
Phlebitis		2		
Hematoma	2	1		
Psychosis	1			
Pressure	2	8	2	8
Totals	38	42	12	22

Arthralgia—always present—varying in degree.

Suture material

The type of suture material did not seem to be of any significance in evaluation of the end result.

Time of separation of cross leg flaps

The earliest successful separation was at 18 days. The longest period for a cross leg application in this series was 54 days. The 8 flaps separated prior to 18 days were considered total losses Reapplications were done in 7 instances 5 of which later produced excellent end results, while 1 was good and 1 was a failure Each reapplication has been considered as a separate cross leg flap Eighty-one flaps were sectioned between the 21st and the 28th day

TIME OF SEPARATION OF CROSS LEG FLAPS

Day of separation	Excellent	Good	Fair	Failures
1 18				8
18-20		1	1	
21 23	15	21	6	3
24-28	14	13	2	7
29-35	8	5	3	1
36 plus	1	2		3
Totals	38	42	12	22

Partial loss of flap at the time of separation

Loss of part of a flap from untimely separation occurred in 6 instances. There were no cut down delays in any of the 6 In two patients the loss was insufficient to classify the results as failures

PARTIAL LOSS OF FLAP AT THE TIME OF SEPARATION

	Number	Area	Day of separation
Excellent	(none)		
Good	2	10%	26
		8%	21
Fair	2	9%	29
		8%	21
Failures	2	30%	28
		25%	28

Failures

As stated previously failures include those in which the intended objective was not attained due to a loss of more than 20 per cent of the flap application. Since there were 22 or 19 per cent failures a consideration of these cases seems indicated. Of the 22 patients, eight of them were 40 years of age or older The distribution of these failures from the point of view of the disorder for which the cross leg procedure was done reveals nothing of significance Among the failures there were 15 thigh flaps and 7 calf flaps. The 15 thigh flaps included 6 tubed grafts all but one of which exceeded 30 square inches Five of the tubed flaps and one of the open flaps were based medially Generally in this series medially based thigh flaps have given poor results. Eleven of the thigh flaps were based distally six of which had been delayed prior to transfer Among the 7 calf flaps all but 2 were delayed. Five of the calf flaps were based in the popliteal area and 2 were raised obliquely or transversely

As to the nature of tissue loss, thrombosis of

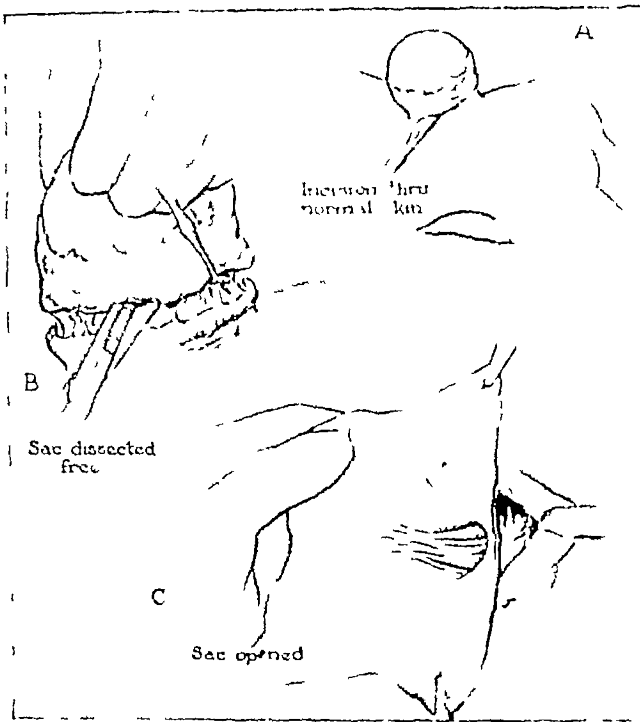


FIG 436

surgeons disagree as to how much sac should be preserved Some feel that this covering is the mechanism for transmission of the cerebrospinal fluid into the blood stream and argue that excessive amputation of the sac will precipitate an acute hydrocephalus The majority disagree with this hypothesis however, and point out that far more important is an attempt to preserve as many as possible of the nerve trunks of the cauda equina that are spread out over the various surface areas of the sac Many of these supposed trunks are non-functioning Active trunks may be identified with the aid of an electric stimulator No attempt should be made to dissect them out freely Such a procedure may deprive them of adequate blood supply and hence degeneration will follow It is better to preserve important nerve filaments "en masse" with their dural attachments Any segments of sac can then be infolded and sutured over

The open edges of the sac are next closed in a water tight manner We prefer to use two layers of horizontal mattress sutures of 0000 chromic catgut (Figs 437, D and E), trimming off excess dural sac as suturing progresses

In order to reinforce the closed membrane, we have always been able to cover it by turning over a flap of the lumbar fascia from either side (Fig 437, F) While it has never been indicated in any of our cases, one could as an alternative, reinforce the dura with a graft of autogenous fascia lata Certain neurosurgeons have advocated preserved fascia lata, fresh homologous fascia lata from a parent or tantalum mesh as a substitute for autogenous fascia lata grafts With this suggestion we completely disagree, since it violates basic principles well known to all plastic surgeons Preserved or homologous fascia lata will degenerate into scar tissue, and foreign material, such as tantalum, will sooner or later produce local reaction and have to be removed

The final and very important step, is to close the skin defect Our procedure consists in the construction of wide based double rotation flaps of skin and subcutaneous fat on either side of the

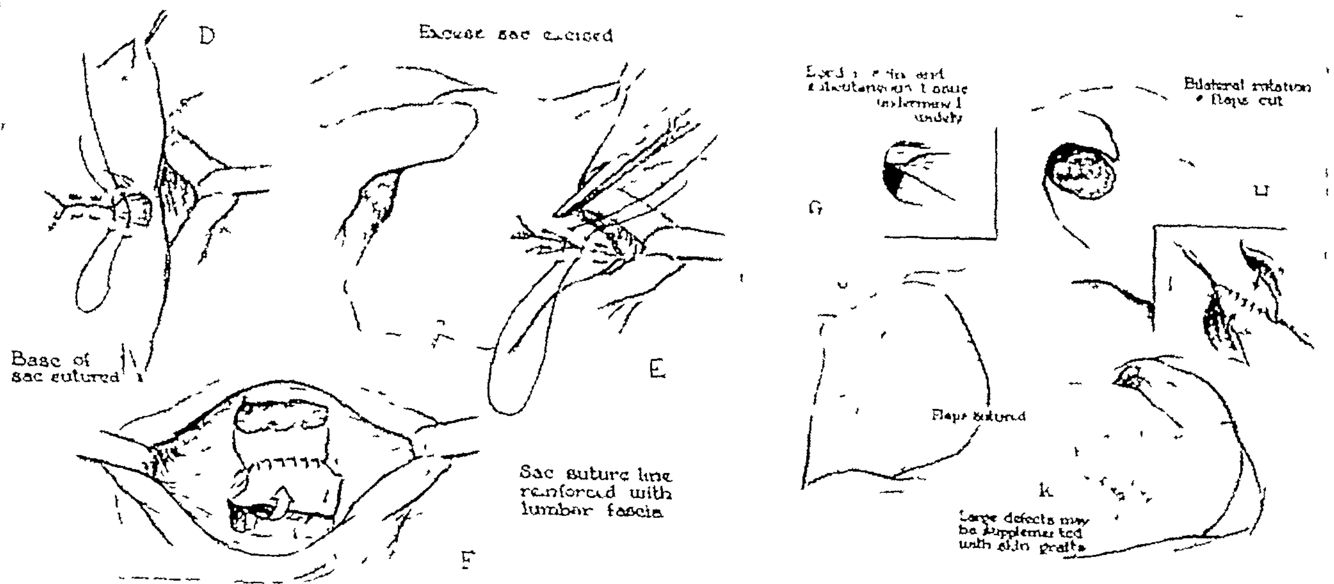


FIG 437

la pierna tobillo y pie En este reporte se discute la técnica del colgajo de "pierna cruzada" y se hace el análisis de 114 casos. Este análisis incluye tambien aspectos de sexo estatura indicaciones lugar receptor área donadora dirección de la base plano anatómico tiempos de demora, complicaciones sección período de observación y fallas En esta evaluación parece que el muslo es una área mas conveniente que la pantorrilla para el colgajo de "pierna cruzada"

B Myelomeningocele, Lymphoedema, Dermal Abrasion

Surgical Repair of Lumbar Myelomeningocele PAUL W GREELEY, M D, Professor, ERIC OLDBERG, M D AND JOHN W CURTIN M D, *Department of Surgery Division of Plastic Surgery and the Department of Neurological Surgery University of Illinois College of Medicine, the University of Illinois Hospitals and St Luke's Hospital, 224 South Michigan Boulevard Chicago 4, Illinois U S A*

Literature which has been published regarding the surgical treatment of lumbar myelomeningocele has emanated chiefly from the neurosurgeons They have pointed out that the tension with which they have had to close the wound after excision of a broad based sac plus the accumulation of cerebrospinal fluid under pressure endeavoring to seek exit through the defect has resulted in frequent breaking down of the tissues with leakage of fluid and eventual infection

It is our purpose in this presentation to review briefly the established facts and to contribute our method of surgical closure which we have found to be uniformly successful to date

Like many other congenital anomalies the etiology of this deformity is unknown It would appear that approximately 25 per cent are associated with hydrocephalus It seems to be a fact however that closure of the lumbar myelomeningocele does not aggravate or increase the degree of hydrocephalus Consequently all meningoceles should be closed surgically if the parents of the child thoroughly understand and accept the hazards of the procedure and more important from the standpoint of future life the possibilities with respect to neurological deficits in the lower extremities the sphincters and sexual power

The time of operation does not seem to be too important Infants a few days old tolerate surgery as well as those a little older though this is not true in very large lesions approaching a sizeable percentage of body weight

If one waits too long many may die of meningitis or of the inanition which frequently accompanies continuous leakage of cerebrospinal fluid. Occasionally if there is no fluid leakage the exposed membranes may "heal over" and allow more time to elapse for the evaluation of impending or increasing hydrocephalus and for estimation of neurological defects These cases however are the exception and most patients in which there is sizeable exposure of membrane will ultimately ulcerate and leak if not repaired Needless to say if there is a complete covering of skin to start with the element of urgency is obviated

Prior to surgery a careful pediatric study of the baby should be carried out Adequate pre- and postoperative antibiotic therapy must be provided The patient must be typed and cross-matched following with a continuous infusion of blood which should be started at the time of operation

OPERATION

The surgery is carried out under endotracheal general anesthesia with the patient secured to the operating table on his abdomen. The head must be placed at a level lower than the buttocks This will prevent an undue sudden loss of cerebrospinal fluid when the sac is opened

A circular incision is made around the base of the sac with a scalpel It is imperative that this be carried out at a level through which good skin covering exists (Fig 436 A) Any attempt to place it higher through poor skin will only leave skin flaps of poor vitality that will break down if utilized in the final wound closure The membranes are then separated from the overlying skin by blunt scissor dissection down to the vertebral canal (Fig 436 B)

The sac is now opened (Fig 436 C) Neuro-

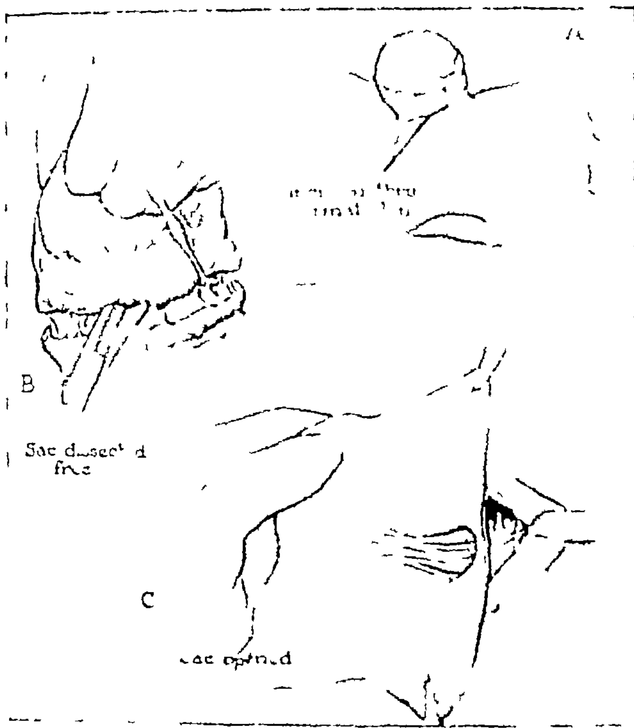


Fig 436

surgeons disagree as to how much sac should be preserved Some feel that this covering is the mechanism for transmission of the cerebrospinal fluid into the blood stream and argue that excessive amputation of the sac will precipitate an acute hydrocephalus The majority disagree with this hypothesis however, and point out that far more important is an attempt to preserve as many as possible of the nerve trunks of the cauda equina that are spread out over the various surface areas of the sac Many of these supposed trunks are non-functioning Active trunks may be identified with the aid of an electric stimulator No attempt should be made to dissect them out freely Such a procedure may deprive them of adequate blood supply and hence degeneration will follow It is better to preserve important nerve filaments "en masse" with their dural attachments Any segments of sac can then be infolded and sutured over

The open edges of the sac are next closed in a water tight manner We prefer to use two layers of horizontal mattress sutures of 0000 chromic catgut (Figs 437, D and E), trimming off excess dural sac as suturing progresses

In order to reinforce the closed membrane, we have always been able to cover it by turning over a flap of the lumbar fascia from either side (Fig 437, F) While it has never been indicated in any of our cases, one could as an alternative, reinforce the dura with a graft of autogenous fascia lata Certain neurosurgeons have advocated preserved fascia lata, fresh homologous fascia lata from a parent or tantalum mesh as a substitute for autogenous fascia lata grafts With this suggestion we completely disagree, since it violates basic principles well known to all plastic surgeons Preserved or homologous fascia lata will degenerate into scar tissue, and foreign material, such as tantalum, will sooner or later produce local reaction and have to be removed

The final and very important step, is to close the skin defect Our procedure consists in the construction of wide based double rotation flaps of skin and subcutaneous fat on either side of the

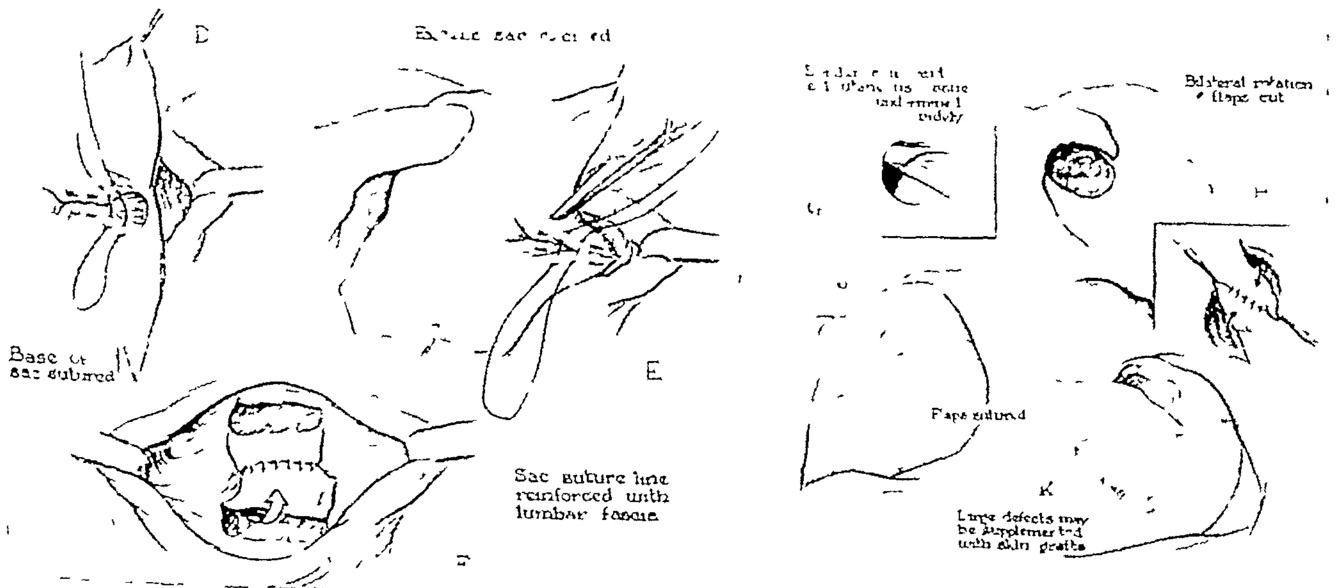


Fig 437

opening (Fig. 437 G and H) These flaps, along with the adjacent lumbar upper buttock coverings are then widely undermined. This permits easy shifting so that the wound can be closed in the shape of a large letter "S (Fig. 437 I and J) with very little tension It is imperative that the undermining be carried out sufficiently far in all directions so that there will be minimal tension on the suture lines If this is not done failure is certain to occur In case the wound is too large to close without undue tension, the flaps should be utilized to cover over the closed sac repair in the center while the lateral defects (Fig 437 K) will be covered with split thickness skin grafts

Finally because skin flaps of this type are prone to develop early postoperative venous congestion, a large pressure dressing is then applied in order to minimize this potential hazard. We have not found it necessary in our cases to consider any type of reconstruction of the bony canal. Should this ever be indicated it must be done at a later operative procedure after the skin flaps have become thoroughly healed, soft and have a well established blood supply

Summary

A new method of skin flap closure over lumbar myelomeningoceles is presented. We have

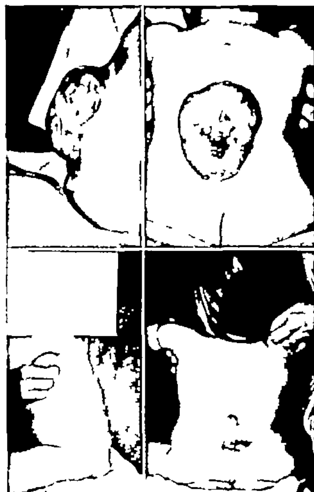


Fig. 438 (top) This 20-month-old child had had many attacks of meningitis that were controlled temporarily with antibiotic therapy Because of the persistent open ulceration of the sac recurrences continued until surgical closure was done Skin graft supplements were anticipated in this broad based case but found to be unnecessary after wide undermining of tissues (Bottom) One year after closure Depression in lower end of wound due to scar tissue retraction into wide bony defect of vertebral canal

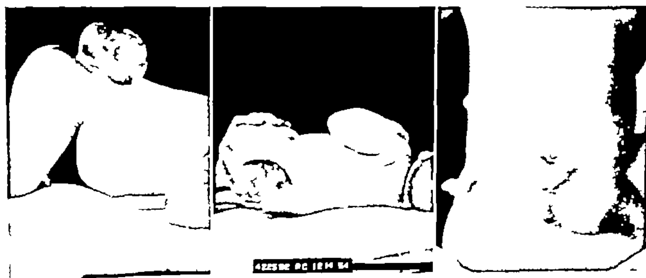


Fig. 439 Five-month-old baby with ulceration of sac Prophylactic antibiotic treatment apparently prevented meningitis complication in this case At right, the early healed result.



FIG 440 (top) Four-month-old child with thin translucent sac Early operation done before sac ruptured or ulcerated (Bottom) Two and one-half years after surgical closure

had no failures to date There has been no postoperative leakage of spinal fluid nor has there been any increase in the degree of hydrocephalus Our skin flaps have remained viable

REFERENCES

1 Chambers, W R Ann Surg, 131 865-868, June 1950
2 Cohn, G A, and Hamby, W B J Neurosurg, 10 3, 297-300, May 1943
3 Correa, R Arch Argnt Pediat, 35 3-20, Jan-Feb 1951
4 Edgerton, M T Surg Cl of North Amer, 32 5, 1327-1345, Oct 1952
5 Fisher, R G Proc Staff Meet, Mayo Clinic, 27 33-38, Jan 16, 1952
6 Greeley, P W, Oldberg, E, and Curtin, J W Trans Am Surg Assoc, 1955
7 Gross, and Sachs Arch Surg, 28 874-888, 1934
8 Ingraham, F D, and Hamlin, H N E J, Med, 228 631-641, May 1943
9 Koritzby, B Zentral f Chir (Leipzig), 77 43a, 1952
10 Kredel, F E Ann Surg, 131 865-868, June 1950
11 Moser, H Wien Klin Wchshr, 63 109-113, Feb 9, 1951
12 Nosik, W A J Neurosurg, 8 540-542, Sept 1951
13 Penfield, W, and Cone, W J A M A, 98 454-461, 1932
14 Villarreal, F V Prensa Med Mex, 5 198-199, Nov 15, 1940

Reparation Chirurgicale Plastique du Myelo-meningocele Lombaire. PAUL W GREELEY, ERIC OLDBERG ET JOHN W CURTIN

Les techniques opératoires précédemment recommandées pour le traitement de cette malformation ont fréquemment abouti à une déhiscence de la plaie, une perte de liquide céphalorachidien et une infection éventuelle Lés auteurs font une revue des faits établis et discurent des complications avec ou sans acte chirurgical La fermeture chirurgicale doit être effectuée avant l'installation d'un écoulement continu de liquide céphalo-rachidien et de la méningite

On décrit un nouveau procédé opératoire qui est relativement simple Les auteurs n'ont pas eu à ce jour d'échecs en utilisant cette méthode Il n'y a pas eu de suintement postopératoire de liquide céphalo-rachidien ni une augmentation de l'importance de l'hydrocéphalie coexistance

Plastisch-operative Behandlung der Lumbal-Myelomeningocele. PAUL W GREELEY, ERIC OLDBERG UND JOHN W CURTIN

Fruhere Operationsmethoden zur Heilung dieses Defektes fuhrten haufig zu einem Aufbrechen der Wunde, dem Verlust von Cerebrospinalflussigkeit und anschliessend zur Infektion Diese feststehenden Tatsachen werden zusammengefasst Komplikationen mit und ohne Chirurgie werden besprochen Der chirurgische Verschluss sollte vor dem Eintreten von Komplikationen wie fortwahrendes Abtropfen von Spinalflussigkeit oder Meningitis vorgenommen werden

Eine neue, verhaltnismassig einfache Operationsmethode wird beschrieben Bislang hatten wir bei Anwendung dieser Methode noch keine Fehlschlage Es ist weder ein postoperatives Auslaufen von Spinalflussigkeit noch eine Zunahme des mit dem Zustand verbundenen Hydrocephalus aufgetreten

---

Artificial Subcutaneous Channels in Draining Lymphoedema.

THORSTEN G STENBERG, M D, AND KARL-ERIK HOGEMAN, M D, *Department of Plastic Surgery, Allmanna Sjukhuset, Malmo, Sweden*

In 1908, *Handley* introduced a method of draining postmastectomy swelling by means of silken threads inserted in an open surgical procedure subcutaneously For various reasons, this procedure was abandoned and modern literature discusses more extensive and radical surgery

Ransohoff in 1945 modified this procedure using nylon threads in the treatment of lymphoedema In 1951 *Zieman* described a procedure of implanting nylon threads through long hollow needles and *Skoog* in a 1952 communication devised a similar technique of burying nylon sutures.

Approximately two and one half years ago stimulated by the communication of Skoog we commenced employing a similar technique. This paper serves as a preliminary report of our observations to date

Using polyethylene tubes one millimeter in diameter with small lateral holes placed at intervals of two centimeters we insert these tubes subcutaneously by means of a flexible metal instrument which resembles an elongated darning needle seventy five centimeters in length. In cases involving the lower extremity the tubes extend from the ankle both laterally and medially to the umbilical level of the abdomen In cases involving the upper limb the tubes extend from the wrist to the anterior and posterior midline of the thorax

The procedure employed in our first cases was to insert six to eight tubes uniformly distributed around the limb involved. However as a result of increased experience and observation of successful healing we now employ as many as twenty tubes distributed in the same manner During the first post-operative week wide-spectrum antibiotics are administered. In the succeeding weeks elastic bandages are applied.

Thus fourteen cases have been treated in the described manner Eight of these cases exhibited gross swelling of either extremity following the performance of radical lymph-node dissection Four cases were genuine lymphoedema and one case involved bilateral postphlebitic swelling of the lower limb The last case in these series was one of excessive oedema of the penis and scrotum after bilateral nodal dissection of the groin.

Diminished swelling together with relief from shooting pains" and cramps was reported in each of the treated cases. By means of "follow up" we found that the pitting oedema diminished radically and observed that the soft tissue gradually assumed a normal consistency

Biopsy specimens including one end of the tube and surrounding tissue procured from nine to twelve months after treatment revealed upon microscopic examination a sheath of collagenous layers formed around the tube (Fig 441 A) and in some cases an inner layer of endothelial like cells was also noted (Fig 441 B) In none of the specimens was a foreign body reaction present

As a direct result of these findings we determined to learn whether or not these collagenous sheaths together with the channels they surrounded would continue to function in the same manner as had the inserted tubes. Selecting four cases at random, we proceeded to extract all the tubes which had been inserted one year before. Into those passages formerly occupied by the tubes we injected a contrast medium (Fig 442 A, B C) This medium was found to disappear from the subcutaneous channels from three to ten minutes after injection This may have been due in part, to diffusion through the collagenous walls In one case the functioning ability of these passages was demonstrated dramatically by an excellent urogram taken 20 min

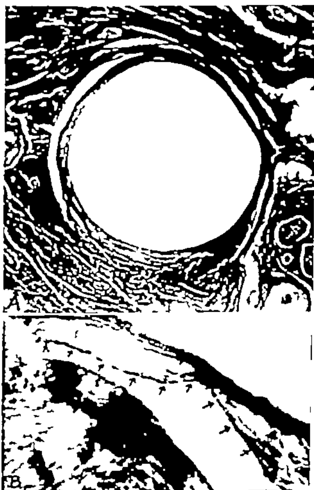


Fig. 441

utes after the injection of thirty cc of contrast medium (Fig 442, D)

Efforts to refill the channels with contrast medium in two cases, four to six weeks later, have failed We do not as yet know if this failure may be due to damage, effected by the previously injected contrast medium However, further clinical research is in progress and recently we have commenced radioactive isotope investigation of the lymphatic outflow both before and after treatment

We also learned from the four cases cited that despite the numerous sideholes all of the more than thirty extracted tubes still provided a perfect passage after one year of subcutaneous interment The clinical affect of tube extraction is not yet definitely established because of both limited amount of material and the limited period of observation However, in these four cases there has been no relapse of pitting oedema from two to six months after extraction In one case a further reduction in the volume of the lower extremity was observed

REFERENCES

1 Handley, W A Lancet, Lond , 1 783, 1908
2 Ransohoff, J L Arch Surg , 50 269, 1945
3 Skoog, T Nord Med , 49 371, 1953 (in Swedish)
4 Zieman, S A J Internat Coll Surgeons, 15 328, 1951

Canaux Sous-Cutanés Artificiels pour le Drainage du Lymphoedeme. THORSTEN G STENBERG ET KARL-ERIK HOGEMAN

Rapport préliminaire relatif aux recherches cliniques concernant une série de cas de lymphoedème On a implanté sous la peau depuis la cheville jusqu'à l'ombilic et du poignet au côté opposé du thorax des tubes en matière plastique d'un mm de diamètre munis de multiples petits orifices latéraux Des spécimens prélevés aux fins de biopsie et comprenant une extr'mité du tube avec le tissu environnant ont montré 9 à 12 mois après mise en place des tubes une gaine de couches



FIG 442

de tissu collagène formée autour du tube et dans quelques cas une couche interne de cellules du type endothélial. Pour se rendre compte si les canaux en question continueraient ou non à fonctionner après extinction des tubes en matière plastique, on a pratiqué immédiatement après l extraction de ce tube des études aux rayons X après injection préalable de substance opaque dans les canaux en question. Présentation des radiographies des canaux Des tentatives pour remplir à nouveau les canaux quelques semaines plus tard ont échoué dans 2 cas étudiés

On a traité 14 cas par l insertion de tubes en matière plastique le nombre des tubes variant de 6 à 20 ans. Les premiers résultats sont encourageants.

Künstliche Subcutane Kanäle für die Drainage von Lymphödemen Thorsten G Stenberg und Karl-Erik Hogmann

Vorläufiger Bericht über klinische Untersuchungen an einer Serie von Fällen mit Lymphödemen Plastische Tuben von 1 mm ø mit zahlreichen kleinen Seitenlöchern wurden subcutan eingepflanzt und reichten vom Knöchel bis zur Nabel höhe beim Bein und vom Handgelenk bis zur entgegengesetzten Seite des Brustkorbs beim Arm

Probeexcisionen einschließlich des einen Endes des Röhrchens und des umgebenden Gewebes entnommen vom 9 bis zum 12 Monat nach der Behandlung zeigten bei der mikroskopischen Untersuchung eine Hülle von kollagenen Schichten um die Tube herum und in einigen Fällen wurde eine Schicht von endothelähnlichen Zellen bemerkt. Um festzustellen ob diese Kanäle fort fahren würden zu funktionieren nachdem die plastischen Tuben herausgezogen worden waren wurden Röntgenuntersuchungen mit Injektion eines Kontrastmittels in die Kanäle angestellt (unmittelbar nach der Entfernung des plastischen Materials)

Röntgenaufnahmen der Kanäle wurden demonstriert, Bemühungen die Kanale 2 Wochen spater wieder zu füllen, waren in 2 der untersuchten Fälle vergeblich. 14 Fälle wurden mit der Ein führung plastischer Tuben behandelt, deren Zahl von 6 bis 20 betrug.

Die vorläufigen Ergebnisse sind ermutigend

Canales Artificiales Subcutáneous en el Drenaje del Linfoedema. Thorsten G Stenberg y Karl-Erik Hogeman

Reporte preliminar de investigaciones clínicas en una serie de casos de linfoedema Se han im plantado tubos de plástico de 1 mm de diámetro con multiples perforaciones laterales y muy pequeñas, subcutáneos, extendiendose desde el tobillo hasta el nivel umbilical en el miembro inferior y desde la muñeca hasta el lado opuesto del tórax en el miembro superior

Los especímenes de biopsia incluyendo el extremo del tubo y los tejidos vecinos tomados de 9 a 12 meses despues del tratamiento revelaron al exámen microscópico una vaina de capas colágenas formadas alderredor del tubo y en algunos casos se noto una capa intima de células que parecían endotelio Para investigar si esos canales pueden o no pueden continuar la función despues de la extracción de los tubos de plástico se realizaron estudios radiológicos mediante la inyección de método de contraste dentro de los canales inmediatamente despues de retirar los tubos de plástico Se demuestran las radiografías de los canales Los esfuerzos para llenar los canels algunas semanas mas tarde han fracasado en dos casos investigados

Catroce casos han sido tratados con la inserción de tubos de plástico variando el número de 6 a 20 Los resultados preliminares son prometedores.

Surgical Treatment of Elephantiasis of Lower Limbs. Dr. Riccardo Pariente Dr. Giovanni Marcozzi, *Istituto di Patologia Speciale Chirurgica e Propedeutica Clinica dell Università di Roma Direttore Prof P Valdoni.*

Although elephantiasis in Italy is not as frequent as in tropical countries where filaria infestation is mainly responsible for the spreading of the disease, nonetheless we have to report quite a remarkable number of patients affected by "elephantiasis nostras" or by chronic oedema of lower limbs.

During the first half of this year in our Institute only we observed four cases of elephantiasis of lower limbs.

It would take too long here to reexamine the various causes determining this affection, whose pathogenicity is as yet practically unknown and we shall limit ourselves to briefly mention that the parasitic form is the one which is the better known, together with the so-called "elephantiasis nostras" As is well known, the latter definition attempts to group the huge variety of chronic oedemas irreversible, some secondary to streptococcal lymphangitis, others certainly and obscurely hereditary and finally those of altogether unknown aetiology

Whatever the aetiology of this affection, the illness is characterized by a progressive sclerosis of lymphatic vessels of an irreversible and serious nature. In all cases of obstruction of the lymphatic circulation, the oedema appears always to affect the subcutaneous tissue and is definitely limited by the "fascia superficialis" As far as we know no alteration of the muscles

and of the other sub-fascial tissues could ever be observed

First, a common oedema appears, easily to be overcome by keeping the patient's limb uplifted the structure of the subcutaneous tissue is still normal at this stage

Progressively, the oedema tends to increase while the chances of success through position draining decrease, microscopically we can observe the growth of a perilymphatic fibrosis, which soon enough will extend also to the surrounding tissue At this stage the skin becomes pale, stretched and shiny, and the hair starts to fall Probably due to a failure of the skin resistance, an infection of an erysipelatous type can easily develop, serving to aggravate the disease

In the final stage, together with a generalized hardening of the superficial tissues of the limb, due to the spreading of fibrosis, a remarkable modification of the skin occurs due to its abnormal stretching, the skin shortly becomes affected by a process of hyperkeratosis, not only the lymphatic vessels but the whole mass of subcutaneous tissue is progressively replaced by a fibrosclerotic tissue

It is through these stages that a true elephantiasis manifests itself

The attempts at medical treatment of this disease are quite recent, up to date no substantial wholly satisfactory result could be reported

The first attempts at surgical treatment go back to 50 years ago The first surgical procedures tried to reestablish the altered lymphatic circulation thus Lanz in 1906 tried to convey the lymph stagnant in the subcutaneous tissue to the bone-marrow, by means of little strips of fascia lata inserted in holes practiced in the femur by means of trepanation

Handley, in 1908, applied the fixation in the subcutaneous tissue of long silk threads reaching from the affected tissues to a region where lymphatic drainage was normal, this treatment was to facilitate the flow of lymph from the affected limb

In 1912 Kondoléon tried to reestablish drainage through the normal deep channels by removing large sections of fascia superficialis

Finally Gillies and Fraser in 1935 tried to reestablish lymphatic circulation by transferring large normal skin flaps which were to form a kind of lymphatic bridge through pathologic tissue

Using all the above mentioned operative procedures, however, as far as we know many poor results were encountered

The essential reason for these failures is to be found in the fact that once the disease has completely developed and has become chronic, it is no longer possible to obtain the regression of changes which in the meanwhile have become altogether irreversible Perhaps in extremely early cases these techniques might yet be successfully applied

It was Homans in 1936 who first described the operative procedure tending to the mass removal of affected tissue Many other authors subsequently practiced similar procedures, with more or less significant variations of technique, which for brevity's sake will not be mentioned here

Our experience, acquired through the observation of clinical cases in our Institute, and supported also by recent surgical contributions of other authors (Kinmon, Gibson, Peer, Lagrot, etc) has led us to conclude that the accurate and radical removal of the whole elephantiasic pathological tissue of the lower limb, and immediate application of wide thin skin-grafts to cover the large raw surfaces thus obtained, may be the most adequate procedure to obtain a definite solution of these pathological processes

We refer now to two cases of "elephantiasis nostras" that we have more thoroughly documented in a film, in their various pre-, inter-, and post-operative stages

First case—A young man, 28 years old, whose first manifestations of illness appeared about 20 years earlier The initial symptoms consisted in a circular tumefaction, mellow and painless in the external submalleolar region of the lower left limb After a period of approximately six years, the tumefaction started to increase in volume, extending to cover also the ankle and back of the foot At that time were noted also alterations in the skin, which over to the affected areas started to show an accentuated dark pigmentation Further, the tumefaction was susceptible to increase in volume after a prolonged erect standing on the part of the patient, while it decreased when he was resting in bed Since such symptomatology was becoming very un-

comfortable, the patient sought relief at various hospitals where in turn he was subjected to various medical treatments without any beneficial result (probably also sclerosing injections were practiced on him) Leg amputation was even advised

The morbid process affecting the lower left limb subsequently extended more and more upward with a very pronounced enlargement of the whole left leg (a true elephantiasis) and it gradually reached the condition observed in figure 443 left center and right.

This was the status of the patient when he asked to be admitted to our Institute. At the time of admission, his lower left limb normal at the thigh and at the knee, showed immediately below the knee an accentuated hypertrichosis Two inches below the patella the skin became briskly glabrous and was invaded by an intense dark pigmentation which extended downward throughout the whole leg

At this same level the soft parts showed a sudden increase in volume, equally distributed all around the limb and which progressively extended to the sole of the foot At the ankle and dorsal region of the foot level the soft tissues had thus increased in volume to give the leg an "odalesque trousers characteristic appearance (see Fig 443)

The subcutaneous tissue hugely increased in volume was of a soft elastic consistence hardly adhering to the underlying layers.

After subjecting the patient to the usual laboratory examinations (which did not show anything abnormal), surgery was practiced on him After accurately emptying the limb of blood by means of an Esmarch bandage we proceeded to remove the elephantiasic tissue first over the dorsal region of the foot and at the premalleolar region. The excision was practiced so as to uncover the aponeurotic fascia superficialis beneath which appeared the tendons of the dorsal region of the foot. In this region we tried to avoid opening the fascia since the tendinous formations once uncovered do not allow skin-grafts to take.

Subsequently we practiced the excision of the portion of pathologic tissue corresponding to the anterior rim of the leg and to its medial and lateral face finally a similar treatment was applied to the posterior face of the leg and to its post-malleolar region At the end of the whole exeresis the complete leg and foot (except the sole which was not involved by pathologic tissue) were free of the elephantiasic tissue down to the aponeurosis of the muscular tendinous layer

The raw surfaces were immediately covered with large skin-grafts of a thickness of about 0 3 mm taken by means of the dermatome from the two thighs and buttocks of the patient.

In this case we did not deem it prudent to take the grafts from the elephantiasic leg itself which would have adequately supplied the quantity of skin required for the repair work, on account of the marked pigmentation and hyper



FIG. 443 First case—pre-operative conditions

keratosis of the skin covering this portion of the leg and due to its pathological features

The grafts were not sutured, but rather laid on a vaseline gauze sheet, and kept in situ by a dressing prepared also with a greased gauze so as to adhere perfectly to the surface to which they were applied

The post-operative result was more than satisfactory—all grafts took so as to cover completely the raw surfaces

Figure 444 shows patient two months after surgery

Second case—A girl, 16 years old, treated by the same procedure as above we shall briefly report the case here

The first symptoms of the disease practically showed themselves from her birth During the first days of the patient's life her parents noted a circular tumefaction at the middle third of her right thigh which gradually increased and extended throughout the whole leg and foot, except the sole

In its first stages the affliction was remarkably amenable to medical treatment Zinc paste dressings were applied, thanks to which a certain improvement could be noted, which however was only temporary The above treatment, associated with physiotherapy was repeated many times always with decreasing effect, up to the time when the patient, realizing that any further attempt at medical treatment was fruitless, asked to be admitted at our Institute

At the time of acceptance in the hospital, as is clearly visible in Fig 445 the patient showed a remarkable increase in volume of the whole lower right limb, more remarkable immediately below the knee, and less pronounced at the level of the thigh The limb appeared to be covered with normal skin, only upon touching it the skin felt drier than the skin of the left limb, which was wholly normal Further, the skin could scarcely be lifted in large folds

The subcutaneous tissue, much increased in volume, was of hard-elastic consistence, not susceptible to modifications on pressure or through position drainage

The usual laboratory exams were carried out, which however did not disclose anything particular

The only difference in the surgical technique which was used as compared with the case described above, consisted in the skin-grafts which



Fig 444 First case—two months after operation



Fig 445 Second case—pre-operative conditions

this time were taken from the same affected leg in view of the normal state of the skin. We thus avoided taking portions of skin from other areas, which notably decreased the patient's discomfort and sped up her recovery

Except for the above, surgery was practiced in the usual manner that is, excision of the entire elephantiasic tissue down to the fascia superficialis large opening of the latter at the level of the muscular origins skin grafts.

The patient's recovery took place normally Fig. 446 shows the local condition at the time she was dismissed from the hospital, one month after her admission

We feel any further comment on this case is superfluous since the technique applied has no doubt been known by many for a long time. The results obtained were truly satisfactory and this has led us to present here our observations We sincerely sponsor the adoption of this technique which we feel is an excellent one, and should be preferred to any other

Via delle Miline 12
Rome Italy



Fig. 446 Second case—one month after operation

Correcting Acne Scars and Other Blemishes by Various Rotary Abrasives.
JOSEPH J ELLER, M D. AND WILLIAM D. ELLER, M. D., *Director of Dermatology and Associate Attending Dermatologist, respectively, to the New York City Hospital, 745 Fifth Ave., New York City, New York, U S. A*

Various types of rotary dermal abrasives have been developed for the removal of cosmetic defects such as pitted scars from acne and smallpox, scars following trauma, tattoo marks, pigmentation, moles, keratoses and rhinophymas This report will present the comparative results obtained with the use of different abrasives, including steel burs, steel wire brushes, heatless stones, and the recently developed diamond and ruby fraises, all of which are powered by the newer high speed rotary motors. In our experience the use of dermal abrasion with procaine-cobefrin local anesthesia and with Freon mixture, a new non-combustible, non-toxic refrigeration anesthetic has made this method more efficient and safe

HISTORICAL BACKGROUND

Kromayer in Germany originated the rotary dermal abrasion technic In 1905 he reported on the use of dental motor-powered tools in dermatologic surgery, in 1929 he again reported on the use of this type of apparatus for the removal of acne and smallpox scars, calling it a "leveling operation," and in 1933 he published another paper on the removal of scars, juvenile warts, freckles, pigmentations, and accidental tattoo marks by "dermal abrasion," using various sized dental burs mounted on a motor-driven flexible cord He stated that this technic left no noticeable scarring

Janson in 1935 used a hand-powered wire brush for removing tattoos Under general anesthesia he sandpapered the face by hand and then used small motor-driven discs for those lesions located in the inaccessible facial contours

Sandpaper abrasion was first developed and reported by Herlyn in Germany in 1939, and later in this country by Iverson This method does not give nearly as good cosmetic results as those obtained by the motor-powered rotary abrasives

McEvitt in 1948 reported on the use of hand and motor-powered tools for the correction of acne pitted scars

In 1949, Schreus demonstrated in Heidelberg, a large series of cases with various skin defects treated by an apparatus of his own design This apparatus rotated various sized heatless stone wheels at 30,000 rpm and incorporated a sleeve to prevent the spattering of blood and skin tissues His report appeared in 1950

Carrie and Haass, both in 1952, similarly reported excellent results with the Schreus apparatus and technic In 1953, Kurtin reported his results with the Kromayer rotary dermal abrasion method but using a steel wire brush instead of the steel bur.

Hermans of Holland, who for some years has used metallic fraises for the abrasion of scars, plantar warts and other lesions, has reported improved results with diamond and ruby fraises Barker, Blackledge, Beers, Eller, Blau and Rein, Reis, Grupper, and others have also reported favorably on their use of various types of metal and stone rotary dermal abrasives

ABRASIVES

Since the introduction of dermal abrasion for the correction of skin defects by Kromayer, new types of abrasives have been developed and used with higher velocity motors After Kromayer's rotary steel bur for abrading away various types of skin defects, heatless stones, stainless steel wire brushes, and diamond and ruby fraises have been developed and used (Fig 447, left) Any one of these rotary abrasives can produce cosmetic improvement, some are much more efficient than others for certain types of lesions

Steel burs have been used by numerous dermatologists in Europe and in this country Reis, who has had extensive experience with these abrasives, states that the use of steel burs has a distinct advantage over the steel wire brush "While planing can be achieved with wire brushes and sandpaper, the small size of the burs is more advantageous and permits greater precision and safety in the treatment of tiny areas Furthermore, it is far easier to control the depths of abrasion with the firm burs than with brushes or sandpaper"

Our results with steel burs have been good in selected cases However, great care must be

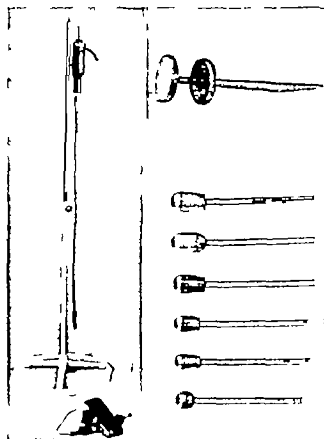


Fig 447 (left) High speed rotary abrasive skin grinder capable of 30,000 r.p.m for use with stainless steel abrasive wheels or heatless stone wheels Protective sleeve is placed on handle to prevent spattering of ground tissues. Speed is controlled by foot pedal (Top right) Stainless steel abrasive wheels. (Lower right) Steel burs

exercised in placing this grinder lightly on the areas to be treated. Steel burs have an advantage over the steel wire brushes in the treatment of tattoo marks and keloids although they generate more heat than the heatless stones or the diamond and ruby fraises the latter two particularly generating very little heat in the tissues. We have also used steel wire brushes in hundreds of cases with good cosmetic results However certain disadvantages are apparent including a tendency for profuse bleeding of the area treated, so as to mask the field of operation.

In addition, in the removal of tattoo marks it is impractical to use the steel wire brush because the pigment collects in between the wire bristles of the brush with the possibility of being ground back into the tissues. Also the brushes must be discarded after each tattoo planing operation, since it is impossible to clean out the pigment thoroughly Therefore in removing tattoo marks the use of heatless stones, diamond and ruby fraises and steel burs are preferable because they are more easily kept clean even during the operation as well as being easier to guide and allowing the operator to see the skin abraded away layer by layer

In using the steel wire brushes at a speed of *12,000* rpm it is necessary to make the skin rigid by refrigeration anesthesia since this lower speed of grinding cannot be done efficiently with procaine anesthesia The higher speed of 30,000 rpm used with either stone or steel fraises, gives an effective smooth grinding with procaine anesthesia since there is no necessity of hardening the skin.

Schreus designed his own apparatus (Fig. 447 top right) using high speed skin grinders with heatless stone wheels. Based on several years' experience he stated that the most favorable speed was a velocity of 30 000 rpm "At this speed the skin can be ground like a hard object so that it is only necessary to stretch the skin moderately and by *no means necessary* to harden the skin by freezing" With this high velocity the slimy ground material is flung aside into a protective sleeve leaving the grinding wheel free and clean (Fig 447 bottom right) The belly of the sleeve is flat and rests on the skin, thereby making it easier for the operator to hold the grinder steady (Fig 448 top)

However the abrasive stone wheel must never be of too fine a grain. Schreus tried a number of grinding wheels of different grains and compositions and found that the grain of the heatless stones made in the United States gave the best results at the above mentioned speed. These stones have a further advantage in that they do not heat the ground track excessively The heat that is generated is just sufficient to close the finest capillaries without coagulating the tissues through excessive heat allowing the operator to work with as little bleeding as possible as well as permitting satisfactory observation of the field of operation

Some observations concerning the Schreus method of grinding may be mentioned here The hand piece should be held with the four fingers of the hand while the thumb is placed firmly near the site to be treated (Fig 449) The hand makes only short linear motions in the direction of the axis of the grinding wheel, with the thumb

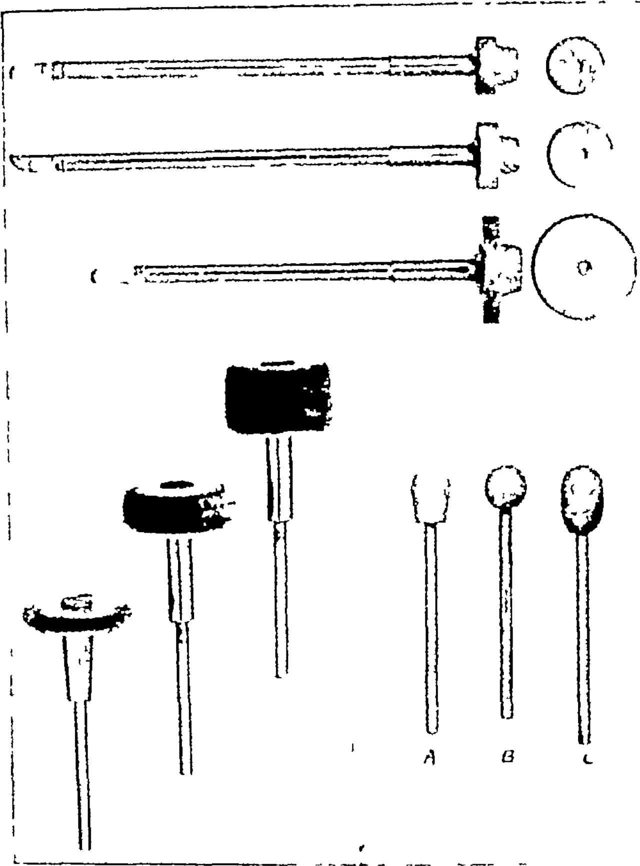


FIG 448 (top) Various sized heatless grinding stones and adapters (Lower left) Various sized stainless steel wire brushes (Lower right) Grinders made of precious stones *A* Diamond Fraise *B* Ruby Fraise *C* Ruby Fraise

as a pivot The grinding tip should never be conducted freely over the skin The above technic will prevent a sudden motion by the patient from causing the grinder to move to another area It further allows the operator to guide the grinding stone completely evenly The beginner has a tendency to set the applicator on the skin with pressure The best procedure is to use very light pressure, which removes only a very thin layer at a time This is particularly advantageous when treating tattoo marks and nevi, because it permits the operator to observe the skin, layer by layer, and to judge the effects, so as to avoid grinding too deeply If the grinding is not too deep, there will be no visible scar after healing

When deeper grinding becomes necessary, as for example in the removal of tattoos, a flat superficial scar may be expected One can say, however, that even after grinding to the lower limit of the corium, the resulting scar is usually not objectionable The tendency to form keloids is surprisingly small for abraded skin The high



FIG 449 Applying skin grinder with protective sleeve Note placing of thumb on skin as a brace and pivot for keeping grinder in position

speed rotary abrasive technic, followed by X-ray therapy, is a good method for removing keloids

Hermans used diamond and ruby fraises He found that this type of stone abrasive did not produce heat and abraded very smoothly and efficiently "In removing pigmentations the grinding of the pigment looks as if it had been erased by a rubber"

Figures 450 through 453 show the excellent cosmetic results in four cases from our records, using various rotary dermal abrasives on different types of skin defects

The high speed rotary abrasives have proven to be much more efficient than "sandpapering,"



FIG 450 (left) Patient P J Age 44 Severe pitted acne scars on right cheek Duration 20 years before dermal abrasion (Right) Patient P J Age 44 Severe pitted acne scars on right cheek Duration 20 years After one dermal abrasion using skin grinder at 30,000 r p m, with heatless stones and "Freon Mixture" as local anesthesia



FIG 451 (left) Patient B.B Age 35 Pitted acne scars on face Duration 20 years before dermal abrasion. (Right) Patient B.B Age 35 Pitted acne scars on face Duration 20 years. After one dermal abrasion using stainless steel wheel grinder at 30,000 r.p.m. and Freon Mixture" as local anesthesia.

which has numerous disadvantages such as the necessity for hospitalization general anesthesia and the possibility of silica granulomas developing from small imbedded sand particles. Additional difficulties are caused by the blood and scraped off tissue forming a smeary slippery mass which interferes with the abrasive action even of coarse sandpaper For this reason the sandpaper method is time-consuming and very trying to the operator The cosmetic results are not comparable to those obtained by rotary abrasion technic

Anesthetizing Agents

With the development of various technics of dermal abrasion from sandpapering to the high speed grinders has come the development of different types of anesthetizing agents.

Kromayer was the first to report on the use of ethyl chloride sprays as a freezing agent when using the rotary steel abrasive

Hermans prefers local anesthesia of procaine. Schreus makes use of procaine-Corbasil (Corbasil is a *vasoconstrictor*) as a local anesthetic and reported excellent results with his heatless stone grinder technic on pitted scars, post traumatic scars keloids moles, and tattoo marks. We agree with Schreus that such local anesthesia has advantages (*1*) because local anesthesia allows for a clearer field of operation and (2) because there is no possibility of masking small areas as with ethyl chloride spray We have added Cobefrin also a vasoconstrictor to the procaine in order to lessen the bleeding

For refrigeration anesthesia we have replaced ethyl chloride with a Freon mixture which is non-combustible non-explosive non-toxic and less irritating We have used the Freon mixture on a large number of cases and found that it anesthetizes and hardens the skin most satisfactorily In addition to the safety factors another advantage with Freon is that the noisy and expensive blower is not necessary The Freon #114 which has been recommended by Wilson Luikart II and Ayres, III we have found to be efficient The Freon mixture which Sternberg demonstrated in New York in June of 1954 is a mixture of #114 and other Freon derivatives and our experience with it has also proven it to be quite efficient We believe that with further experience with the Freon better and better mixtures will be developed for our *purposes*.

Treatment

Unlike the hospitalization and general anesthesia required with sandpaper abrasion, dermal



FIG 452 (left) Patient R J Age 19 Tattoo mark on arm of one year duration before rotary abrasive therapy (Right) Patient R J Age 19 Tattoo mark on arm of one year duration After one dermal abrasion using skin grinder with heatless stones at 30,000 r p m and procaine-cobefrin local anesthesia

abrasion done by the high speed rotary abrasive technics is a procedure which can be done easily and safely in the operating room of the physician's office

We have found that healing has been best and the patient is most comfortable by using sterile "Telfa" strips, a non-adherent dressing, changed daily, and where convenient, twice daily during the first two or three days, because of the profuse amount of exudation of serum which occurs during this period For the next several days, sterile petrolatum dressings are applied daily As a rule, these dressings can be discontinued after the fifth or sixth day Epithelization continues up to twelve to fourteen days, and during this time the patient feels more comfortable if a thin lubricant such as Liquid Albolene or lanolin is applied a few times daily for another two weeks When a lubricant is not used, the patients usually complain of tightness and dryness of the skin These lubricants not only relieve this, but enhance the healing

In some cases small, superficial milia appear in the operative sites, which can be easily removed with a stylet with no scarring Their formation is due to an artificial closure of the opening of the sebaceous gland, and even without treatment these milia disappear in a short time

Sometimes, following complete epithelization, there may be erythematous areas and uneven pigmentation on the skin This usually disappears without treatment in a few months

For the average case one or two dermal abrasions are usually sufficient to obtain an excellent cosmetic result The number necessary in any case will, of course, depend upon the type and severity of scars, as well as on the depth to which the operator abrades the skin tissues



FIG 453 (left) Patient W W Age 50 Marked telangiectasia of the nose before rotary abrasive therapy (Right) Patient W W Age 50 Marked telangiectasia of the nose After one planing using skin grinder at 30,000 r p m with heatless stones and "Freon Mixture" as local anesthesia

COMMENT

Rosenberg, in his photomicrograph of healed areas which followed successful abrasion of a facial tattoo, showed ample sebaceous structures at the lower one third of the dermis These reports demonstrate that on the face, at least, one can abrade down to the sweat gland level and not produce scarring It is therefore, readily apparent that the face is a *unique area* for the application of dermal abrasion As facial skin is richly seeded with pilosebaceous units, re-epithelization is rapid and healing takes place without clinical scarring The healed skin also does not have the glazed appearance of scar tissue

Since dermabrasion removes some of the pilosebaceous units from the skin, and since this unit is the pathologic locus in acne vulgaris, the method could be applied to the treatment of an

active acne process We have done this with excellent results on recalcitrant cases of acne especially the pustular and cystic types. However it is best not to use Vaseline dressings or any other lubricant post-operatively as this may aggravate the acne. Sterile 'Telfa dressings are used for five to six days This is followed daily by wet compresses of boric acid to hasten the removal of the crusts.

Summary and Conclusions

High speed rotary abrasive technic has given the most satisfactory cosmetic results for the correction of pitted acne scars smallpox and post traumatic scars pigmentations and for the removal of tattoo marks

Since this method originated five types of rotary abrasives have been developed including steel burs steel wire brushes heatless stones and diamond and ruby fraises While any of these abrasives in experienced hands can produce cosmetic improvements the stone abrasives have been found to be more efficient than others (the steel burs or brushes) especially when powered by higher velocity motors (30,000 rpm)

Two types of local anesthesia may be used—procaine or refrigeration anesthesia such as ethyl chloride or Freon mixture We prefer the latter because it not only anesthetizes and hardens the skin efficiently but in addition it is non-combustible non-explosive non-toxic odorless and has no anesthetizing effect when inhaled

For linear scars or small areas with pitted scars, pigmentations, tattoos and other small lesions, procaine local anesthesia has the advantage of keeping the field of operation visible at all times and not disguised as by freezing

References

1 Kromayer E. Dermat. Ztschr 12 26 1905
2 Idem Monatsschr Aerztl Polytech 27 101 1905
3 Idem Munchen med Wchnschr 52 942 1905
4. Idem Deutsche med Wchnschr 31 179 1905
5 Idem Cosmetic Treatment of Skin Complaints New York Oxford Univ Press, 1930 p 9
6. Idem Kosmetologische Rundschau 4 61 1933
7 Idem Dermat. Schnschr 101 1300 1935
8. Idem Lexikon d. Kosmetischen Praxis Wien, 1936
9 Janson P Dermat. Wchnschr., 101 894 1935
10 Herlyn K. E. Zentr f chirurgie 1949 p 45
11 Idem Munch Med Wschr., 1939 p 86
12 Iverson P C Surgery 2 427 1942
13 Idem Plast & Reconstruct. Surg., 2 427 1947
14 Idem ibid 12 27 1953
15 McEvitt W G J Michigan M Soc., 47 1243 1948
16 Idem J A. M A., 142 647 1950
17 Schreus H. T Arch Dermat. u Syph., 191 678 1950
18. Idem Zeitschrift fur Haut und Geschlechtskrankkheiten Bd XII Heft 9
19 Carrie V C Der Hautarzt 3 Jahrgang 9 Heft, S 425 Sept. 1952.
20 Haas P V Z.f Haut-u. Geschl Krkh., 12 14 1952
21 Kurtin A Arch Dermat & Syph., 68 389 1953
22. Ibid., 70 520 1954
23 Hermans E. H., Jr Personal communication, 1953
24. Barker D E. Annals of Western Medicine and Surgery 5 475 1951
25 Blackledge O C Ohio Medical Journal 49 614, 1953
26 Beers M D GP 9 66 1951
27 Eller J J New York State J Med 54 1166, Apr 15 1954
28 Idem Medical Times 82 00 1954.
29 Blau, S and Rein C R. Arch. Dermat & Syph., 70 754 Dec 1954
30 Reiss F J A M A., 154 534 1954
31 Idem Arch Dermat & Syph 69 744 1954.
32 Grupper C Bull Soc Franc Dermat. et Syph 60 429 1953
33 Gross, E R., Wright C S Dobes, W L., and Seltzer A. P Mod. Med 22 146 1954
34. Hartman M S. Arch Dermat. & Syph., 66 123 1952
35 Hubler W R. ibid., 70 513 1954
36 Leader M and Buncke C M ibid 69.563 1954
37 LeVan P Ibid., 69 730 1954
38. Idem 71 113 1955
39 Localio A. S Gilette L and Hinton, J W Surg., Gynec & Obst., 89 69 1949
40 Lowenthal L J A Arch Dermat. & Syph., 67 629 1953
41 Strakosch E. A. Arch. Dermat. & Syph., 67 53 1953
42 Winter L Brit J Dermat., 62 83 1950
43 Zugarman, I. Arch Dermat. & Syph., 51:209 1946
44. Rosenberg W A Ibid 65 466 1952
45 Wilson, J W Laikart, R. H and Ayres, III Arch Dermat 71 523 1955
46 Sternberg A Demonstration of Freon Mixture. Skin and Cancer Unit, University Hospital, New York University *Bellevue Medical* Center June 1954.

La Correction des Cicatrices d'Acne et d'Autres Tâches Cutanées par Divers Abrasifs Soumis a un Mouvement Rotatoire. JOSEPH JORDON ELLER ET WILIAM D ELLER

Il s'agit ici d'un rapport sur l'emploi de divers types d'abrasifs à grande vitesse rotatoire, tels que meule striée en acier inoxydable, brosse à poils d'acier, roue en pierre réfractaire et fraise en diamant Les diverses variétés d'appareils, d'abrasifs et de vitesse utilisés ont été étudiés pour se rendre compte de ceux qui se montrent le plus efficaces pour chaque type spécifique des lésions et l'on a de même étudié les types d'anesthésie à appliquer dans chaque cas Dans les cas où une anesthésie par réfrigération est désirable, l'emploi du "Freon"—nouveau produit non combustible non explosif et non toxique et dépourvu d'effet anesthésique général a été trouvé préférable à celui du chlorure d'éthyle

Avec 30 000 tours/minute la peau peut être meulée comme un objet dur, de sorte qu'il est inutile d'avoir recours à une anesthésie par réfrigération à moins que l'opérateur ne le désire Par conséquent, à la vitesse précédemment mentionnée, l'anesthésie locale à la procaine peut être utilisée Cette dernière a l'avantage de laisser toujours visible le champ opératoire (et de ne pas le masquer par givrage), ce qui la rend particulièrement applicable dans le traitement des petites lésions des contours de la face, des cicatrices linéaires, des pigmentations et des tatouages Il a été également noté que les vitesses de 18 000 à 30 000 tours/minute donnent un meulage plus lisse que les vitesses plus basses Des plaques de projection ont permis de montrer les divers types d'appareils, les différentes meules abrasives, ainsi qu'un certain nombre de cas avant et après traitement

Über Korrektur von Akne-Narben und Anderen Schonheitsfehlern mit verschiedenen Schleifmitteln. JOSEPH JORDAN ELLER UND WILLIAM D ELLER

Es wird ein Bericht gegeben uber den Gebrauch verschiedener Typen von schnell umlaufenden Schleifmitteln wie nichtrostende eingekerbte Rader, Stahldrahtbursten, nicht heisz werdende Steinrader und Diamantfrasen Die verschiedensten Arten von Apparaturen, Schleifmitteln und Umdrehungsgeschwindigkeiten wurden studiert, um festzustellen, welche die brauchbarsten fur jede spezifische Form von Lasion sei Auch die Art, der bei den einzelnen Fallen anzuwendenden Schmerzausschaltung wurde untersucht In Fallen, in denen Gefrierungsanasthesie wunschswert ist, wurde das "Freon"—ein neues nicht brennbares, nicht explosionsfahiges und untoxisches Praparat ohne allgemein betaubende Wirkung dem Chloraethyl vorgezogen

Mit 30,000 Umdrehungen pro Minute kann die Haut wie ein fester Korper geschliffen werden, so dasz es nicht notwendig ist, Gefrieranaesthesie anzuwenden, falls es nicht der Wunsch des Operateurs ist So kann bei der erwahnten Geschwindigkeit Procain-Lokalanaesthesie benutzt werden Diese hat gewisse Vorzuge insofern als das Operationsgebiet immer sichtbar bleibt (und nicht wie beim Gefrieren verdeckt wird), wodurch es besonders fur kleine Lasionen, Gesichtsumrisse, strichformige Narben, Pigmentationen und Tatowierungen anwendbar ist Es wurde auszerdem festgestellt, dasz es sich bei Geschwindigkeiten von 18 000 bis 30 000 R P M viel glatter schleifen laszt als bei niedrigeren Geschwindigkeiten Die verschiedenen Typen der Apparate und die verschiedenen Schleifrader wurden an Hand von Diapositiven illustriert, ebenso durch eine Auswahl von Fallen vor und nach der Behandlung

---

C. *Miscellaneous*

Mistakes and Accidents Encountered in Plastic Surgery. ARTHUR JOSEPH BARSKY, M D, *Professor of Plastic Surgery, Albert Einstein College of Medicine, 174 East 72nd St, New York 21, New York, U S A*

I hesitate to introduce a dissonant note in these proceedings, a note that might indicate that all is not always sweetness and light in the practice of Plastic Surgery But this, may I hope, will serve as the dim and distant voice of conscience I hesitate, too, because of the feeling that the audience may little note that I am not the perpetrator of these errors, but perhaps long remember "those dreadful cases that Barsky showed" May I emphasize, therefore, that I am merely the reporter, not the instigator

The inherent hazards of surgery are sufficient unto themselves, there should be no place in surgery for carelessness, which is the most frequent cause of mistakes and accidents Aside from carelessness, mistakes occur from a variety of reasons,—because of lack of knowledge, even ignorance, or the use of questionable or faulty techniques And these must be differentiated from untoward incidents and accidents

The commonest type of error in the operating room is the use of the "wrong solution" Invari-

active acne process We have done this with excellent results on recalcitrant cases of acne especially the pustular and cystic types However it is best not to use Vaseline dressings or any other lubricant post-operatively as this may aggravate the acne. Sterile 'Telfa' dressings are used for five to six days This is followed daily by wet compresses of boric acid to hasten the removal of the crusts.

Summary and Conclusions

High speed rotary abrasive technic has given the most satisfactory cosmetic results for the correction of pitted acne scars smallpox and post traumatic scars pigmentations and for the removal of tattoo marks.

Since this method originated, five types of rotary abrasives have been developed including steel burs steel wire brushes heatless stones and diamond and ruby fraises. While any of these abrasives in experienced hands can produce cosmetic improvements, the stone abrasives have been found to be more efficient than others (the steel burs or brushes) especially when powered by higher velocity motors (30 000 rpm)

Two types of local anesthesia may be used—procaine or refrigeration anesthesia such as ethyl chloride or Freon mixture. We prefer the latter because it not only anesthetizes and hardens the skin efficiently but in addition, it is non-combustible non-explosive non-toxic odorless and has no anesthetizing effect when inhaled

For linear scars or small areas with pitted scars pigmentations tattoos and other small lesions, procaine local anesthesia has the advantage of keeping the field of operation visible at all times and not disguised as by freezing

References

1 Kromayer E. Dermat. Ztschr 12 26 1905
2 Idem Monatschr Aerztl Polytech 27 101 1906
3 Idem Munchen med. Wchnschr 52 942 1905
4. Idem Deutsche med. Wchnschr 31 179 1905
5 Idem Cosmetic Treatment of Skin Complaints New York, Oxford Univ Press 1930 p 9
6 Idem Kosmetologische Rundschau 4 61 1933.
7 Idem Dermat. Schnschr., 101 1306 1935
8. Idem Lexikon d Kosmetischen Praxis Wien 1936
9 Janson P Dermat Wchnschr., 101 894 1935
10 Herlyn, K E. Zentr f chirurgie 1949 p 45
11 Idem Munch. Med Wschr 1939 p 86
12 Iverson P C Surgery 2 427 1942
13 Idem Plast & Reconstruct Surg., 2 427 1947
14 Idem ibid., 12 27 1953
15 McEvitt, W G J Michigan M Soc., 47 1213 1948
16 Idem J A M A., 142 647 1950
17 Schreus H T Arch Dermat u Syph., 191 678 1950
18. Idem Zeitschrift fur Haut und Geschlechtskrankkheiten Bd. XII Heft 9
19 Carrie V C Der Hautarzt, 3 Jahrgang 9 Heft 8 425 Sept. 1952
20 Haas, P V Z f Haut-u. Geschl. Krkh 12 14 1952
21 Kurtin, A Arch. Dermat. & Syph., 68 389 1953
22 Ibid., 70 520 1954
23 Hermans E. H Jr Personal communication, 1953
24 Barker D E Annals of Western Medicine and Surgery 5 475 1951
25 Blackledge O C Ohio Medical Journal 49 614 1953
26 Beers M D GP 9 66 1954.
27 Eller J J New York State J Med., 54 1166, Apr 15 1954
28 Idem Medical Times 82 ·00 1954
29 Blau S., and Rein, C R Arch Dermat & Syph 70 754 Dec. 1954.
30 Reiss F J A M A., 154 534 1954
31 Idem Arch Dermat & Syph., 69 744 1954
32. Grupper C Bull Soc Franc Dermat. et Syph., 60 429 1953
33 Gross E R., Wright C S Dobes, W L., and Seltzer A P Mod. Med 22 146 1954.
34. Hartman, M S Arch Dermat & Syph 66 123 1952.
35 Hubler W R. ibid 70 513 1954.
36 Leider M and Buncke C M ibid 69 563, 1954
37 LoVan P ibid 69 739 1954
38. Idem 71 113 1955
39 Localio A. S Gilette, L and Hinton, J W Surg Gynec & Obst 89 ·60 1949
40 Lowenthal L J A. Arch Dermat. & Syph., 67 629 1953
41 Strakosch E. A Arch Dermat & Syph., 67 53 1953
42 Winter L Brit J Dermat 62 83 1950
43 Zugarman, L Arch Dermat. & Syph., 54 :209 1946
44 Rosenberg W A. ibid., 65 466 1952.
45 Wilson, J W Luikart, R. II and Ayres, III Arch Dermat 71 523 1955
46 Sternberg A Demonstration of Freon Mixture Skin and Cancer Unit, University Hospital New York University Bellevue Medical Center June 1954.

jected (Fig 455) This patient, not one of my countrymen, had had paraffin injected in order to evade military service He succeeded but subsequently the skin sloughed away Eventually he was re-surfaced

In this second category of causes, I will have to include some 49 patients, seen in the last ten years, who have had nasal plastic operations that were not properly performed I do not mean cases in which there was some small residual defect, but cases in which the patient sustained a genuine disfigurement, clearly the result of the operation itself This illustration (Fig 456) shows a thirty-two-year-old woman who had been operated upon seven times by the same surgeon for what she claimed was an ordinary large nose In attempting to fathom the psychology of such a patient, I questioned her closely and she reported that after each operation the nose became worse, not better Thus one must be inclined to attribute the blame not only to the poor surgery but also to the low-grade intelligence of the patient Mistakes all too often made in nasal plastic surgery are excess removal of the cartilage of the tip and the removal of too much of the lining, and that is apparently what has happened here as a result of the seven operations This patient was unwilling to be operated upon if she had to go to a hospital

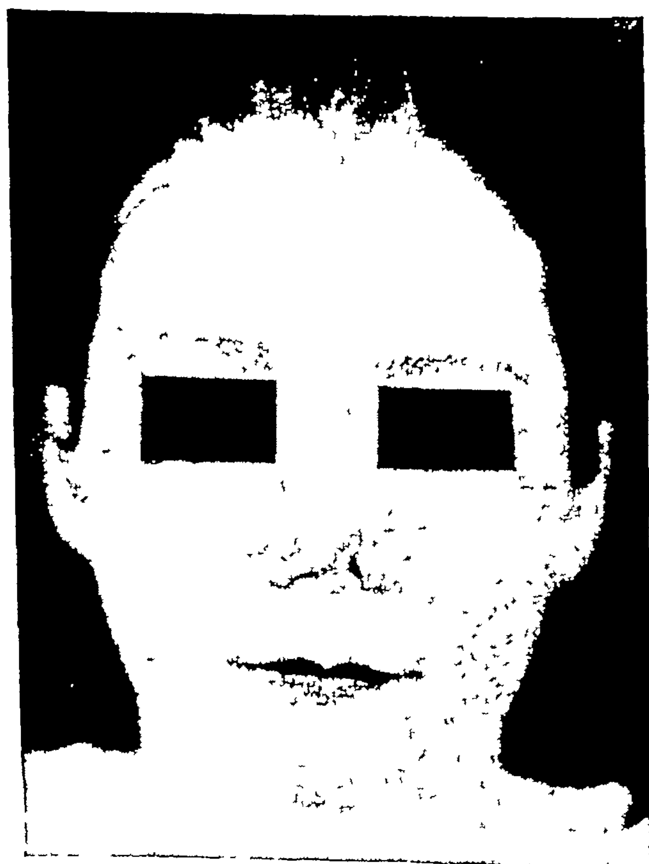


Fig 456 A 32-year-old woman who had nasal plastic operations seven times by the same surgeon

The next group of cases consists of those where the result is generally accidental in nature In a number of these, radiation was involved, and I should like it clearly understood that we think that radiation therapy has a very definite and important place in our armamentarium, we have no quarrel with its use but we object strenuously to its misuse

I feel that radiation is not infrequently used in the treatment of hemangiomas in instances where surgery would be preferable Our practice in regard to cavernous hemangiomas in children is to excise them *generally if their location and extent will permit so doing* in one operation and will not produce disfigurement The lip and the nose are areas where this can very frequently be done The child shown in the accompanying illustration (Fig 457, left) had a cavernous hemangioma of the nasal tip It was excised, and here is the result obtained by one operation (Fig 457, right)

The next illustrations are of a 15 year old boy who received heavy radiation therapy for what was reported as a hemangioma of the central portion of his lip His present condition needs no comment (Fig 458) The lip was repaired by a cross-lip flap and here is the patient at the conclusion of our surgery (Fig 458). I feel, however, from the original description, that simple excision would have served the purpose

The next illustration (Fig 459) shows a young girl of 19 years who was born with a hemangioma of the tip of her nose She was heavily

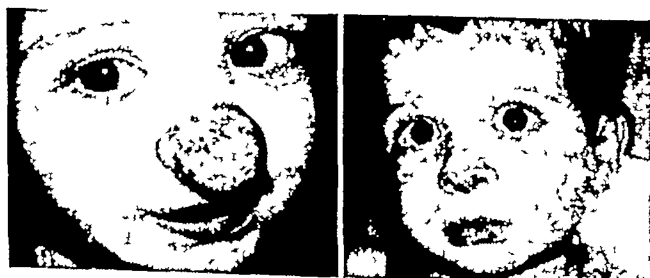


Fig 457 (left) Cavernous hemangioma in a young child (Right) The result obtained by simple excision in one operation Where surgery is practicable, it is felt to be the method of choice

ably this is the result of carelessness. It is the surgeon who sets the tone for the operating room and if he is haphazard, the personnel associated with him all too often will share this shortcoming A few simple rigid rules can prevent the use of wrong solutions and the injection of harmful materials If a local anesthetic agent is used it should be placed in one particular kind of transparent container and this container *never used for any other purpose. Actually* before injecting any solution, its nature should be confirmed by the nurse in definite certain terms I know of an incident where the surgeon injected in place of procaine with six drops of adrenalin per ounce *adrenalin one ounce with six drops of novocaine* Cocaine solutions, too have been injected This may be avoided by the addition of harmless coloring material used as a standard throughout the hospital. An incident was brought to our attention a short time ago where instead of 1 per cent acetic acid for a wet dressing in the operating room the surgeon was given, and applied *glacial acetic acid! I had occasion recently to see an infant with an extensive skin slough*—the child's own father gave a hyperdermoclysis of 70 per cent alcohol instead of saline! All these are careless mistakes inexcusable and with a systematic rigid operating room routine they should never occur

Under the second category the cause varies from simple lack of knowledge and poor planning to sheer ignorance and, further to the use of questionable and faulty techniques. As examples of this, I might cite the case in which a general surgeon migrated a flap from the chest to the arm in a nine-year-old girl When seen some ten years later she had breast tissue growing on the arm *Another example of faulty* planning was indicated in the case where a surgeon included the pubic area with his abdominal tube pedicle This was migrated to the chin of a little girl patient At puberty she began to grow hair on her chin Errors of this type need not occur if the surgeon exercises a modicum of thought in planning his procedure.

Under the heading of questionable and faulty techniques may be included the injection of paraffin. One would hope that the pernicious practice had been completely abandoned everywhere This illustration (Fig 454) shows the face of a young woman injected with paraffin She was a native of a nearby country and is one of some twenty patients injected by a practitioner before the authorities caught up with him. A number of operations upon this patient yielded indifferent results, for the paraffin had infiltrated the skin and the deeper tissues as well.



Fig. 454 Recent injection of paraffin in the face and neck of a 24-year-old woman.

Here is another case where paraffin was in-

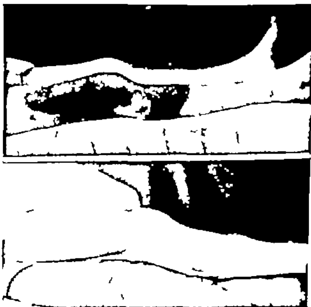


Fig. 455 (top) Skin slough following injection of paraffin to avoid military service. (Bottom) Resurfacing by means of intermediate thickness skin grafts

reported negative The diagnosis was of course obvious, and all our biopsies showed actively growing squamous cell carcinoma As a result of his almost incredible carelessness, this physician has lost his hand

While we are on the subject of radiation, I shall refer to what I call my trilogy Here is the X-ray of a patient (Fig 461) who was treated by a dentist, and accidentally a small dental instrument was aspirated Attempts to remove it by bronchoscopy and under fluoroscopy were unsuccessful The next illustration (Fig 461, lower left) shows what happened to the patient's back—a severe radiation burn extending practically down to the bone This required excision and resurfacing by a local flap with free graft to the donor area of the flap (Fig 461, lower right) And here (Fig 462, upper) is the hand of the nurse that held the patient in position She required flaps to the dorsum of three fingers And, finally, this is the hand of the surgeon who attempted the removal of a foreign body under fluoroscopy (Fig 462, lower), with extensive destruction of the skin, the extensor tendons, and the capsule of the interphalangeal joint This story would be ludicrous were it not so tragic

If I have dwelt upon radiation injuries at length it is because I feel that all plastic surgeons should remind their medical colleagues that radiation is a powerful instrument which may, if not properly handled, turn upon its user



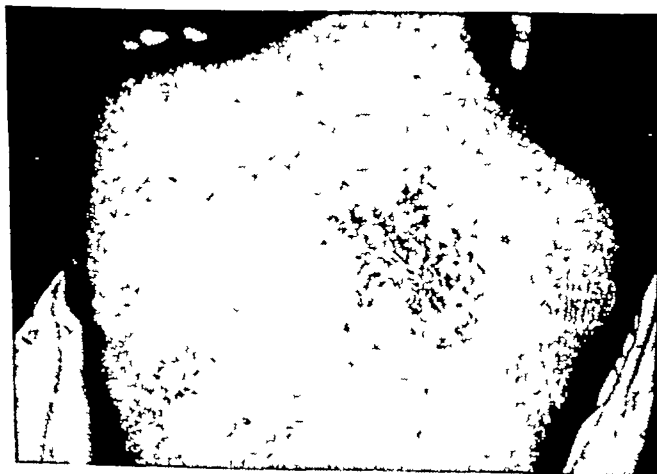




Fig 461 (top) X-ray of patient's chest showing small dental instrument accidentally aspirated (Lower left) Severe radiation burn extending down to the bone This followed an unsuccessful attempt to remove the dental instrument under fluoroscopy (Lower right) Radiated area had to be excised and a local flap used to fill in the defect, with a free graft to the donor area of the flap

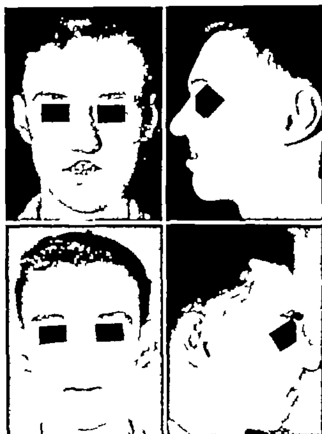


FIG. 458 (upper left) A 15-year-old boy whose lip had been radiated for hemangioma. (Upper right) Side view (Lower left) Postoperative result obtained by cross lip operation in two stages (Lower right) Postoperative profile view

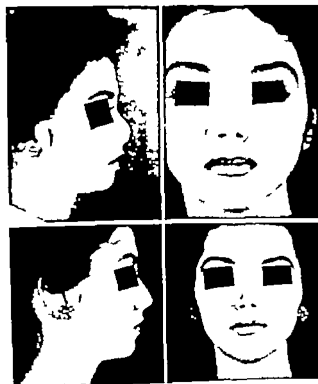


FIG 459 (upper left) A 19-year-old girl who had had radiation for hemangioma of the nasal tip radiated in childhood and this is her condition when I first saw her She gave a history of a previous attempt at repair by means of an arm flap and as a result of this she had sustained an ulnar nerve paralysis of her left forearm and hand. This was apparently the result, so far as we were able to determine of the application of a cast In order to convince ourselves of this, we repaired the defect by using a flap from the opposite arm but without the development of paralysis

There is an expression among lawyers that the lawyer who pleads his own case has a fool for a client So far as the doctor is concerned it might well be paraphrased Here is a 55 year old medical man (Fig 460) who developed an ulcer of the palm of his hand He was not quite sure of its cause but suspected that it might be due to the fluoroscope which he used frequently He treated himself with simple remedies even to the extent of taking biopsies himself which were



FIG 460 The hand of a 55-year-old medical man who used defective X-ray machine and neglected treatment. He had actively growing squamous cell carcinoma.

(Upper right) Previous attempt at repair elsewhere by means of an arm flap produced an ulnar nerve paralysis of the left hand (Bottom) Postoperative result obtained by means of a tube pedicle from the opposite arm.

la mise en oeuvre d'une solution fausse Quelques règles simples et rigides pourraient éviter une telle erreur L'injection de paraffine, condamnée par tous, est encore utilisée par certains

On a insisté sur les risques et les dangers que font courir le traitement par irradiation, non seulement au malade mais encore au chirurgien

Irrtumer und Zwischenfalle in der Plastischen Chirurgie. ARTHUR JOSEPH BARSKY

Eine Anzahl von ungewohnlichen Irrtumern und Zwischenfallen (glucklischerweise nicht die des Autors), die in der plastischen Chirurgie zu beobachten sind, werden beschrieben Die haufigste Ursache ist Sorglosigkeit, die in der Chirurgie verpont sein sollte, da das der Chirurgie wesenseigene Risiko bereits gross genug ist Andere Ursachen sind Mangel an Kenntnis, selbst Ignoranz, oder die Anwendung fragwurdiger oder falscher Methoden

Der im Operationssaal am haufigsten vorkommende Missgriff ist der Gebrauch falscher Losungen Durch einige einfache aber strenge Vorschriften kann dies vermieden werden Die Injektion von Paraffin, obwohl von allen verworfen, ist immer noch in Gebrauch Auf das Risiko der Strahlentherapie und ihre Gefahren sowohl fur den Patienten als auch fur den Arzt wird besonders hingewiesen

Errores y Accidentes Encontrados en Cirugía Plástica. ARTHUR JOSEPH BARSKY

Un gran número de errores y accidentes (afortunadamente no del autor) encontrados en Cirugía Plástica se describen El mas frecuente es el descuido, el cual no debe existir en Cirugía dado los riesgos que ya de por si son bastantes Otras causas son la falta de conocimientos, aun la ignorancia o el uso de técnicas discutibles o malas

El error mas comun en la sala de operaciones es el uso de soluciones equivocadas Unas cuantas reglas simples y rígidas pueden evitar esto La inyección de parafina, condenada por todos aun se hace

Se señalan los peligros de la terapia por radiación no nada mas para el paciente sino para el cirujano

---

Referred to a South African Plastic Unit.

DENNIS WALKER, M B, B Ch, F R C S (Ed), F R F P S (G), Dip Surg (Raud), *12 Durris Road, Forest Town, Johannesburg, South Africa*

The continent of Africa has a population of about 160,000,000 souls, the part known as the Union of South Africa contains about 11,000,000 people The vast majority of these are unable to afford to pay for surgery, therefore hospital out-patient departments are busy and because of ignorance and great distances, many patients seek the help of plastic surgery for the first time when they are adults

Most of the cases illustrated were purely for the purpose of showing the problems confronting the Unit rather than demonstrating the results of treatment

One of our patients had a history that gave little help in diagnosis His speech was bad There was no history of trauma Facial scarring showed evidence of hypertrophic as well as atrophic pathology It has been suggested that this was a case of untreated tuberculosis and syphilis

Untreated syphilis is, largely through ignorance, not uncommon and presents challenging problems in reconstruction One commonly sees destruction of the nose and eye with marked facial disproportion A nasal problem alone is not uncommon The profile is always poor Treatment of these cases is usually started with a conventional post-nasal inlay There is deliberate over-correction at first but eventually an inconspicuous prosthesis is attached to a denture

A good example of an untreated facial swelling (Fig 463, left)—present since birth and steadily progressive—revealed the presence of bony hypertrophy of the maxilla as well as soft tissue swelling

This was a plexiform neuroma—by no means uncommon

Most of our patients are unfamiliar with the subtleties of modern mechanical devices, for example oil cooking stove explosions are not uncommon and often inadequately treated when they occur, as this one did, about 400 miles away from our unit (Fig 463, right) A band



FIG 463

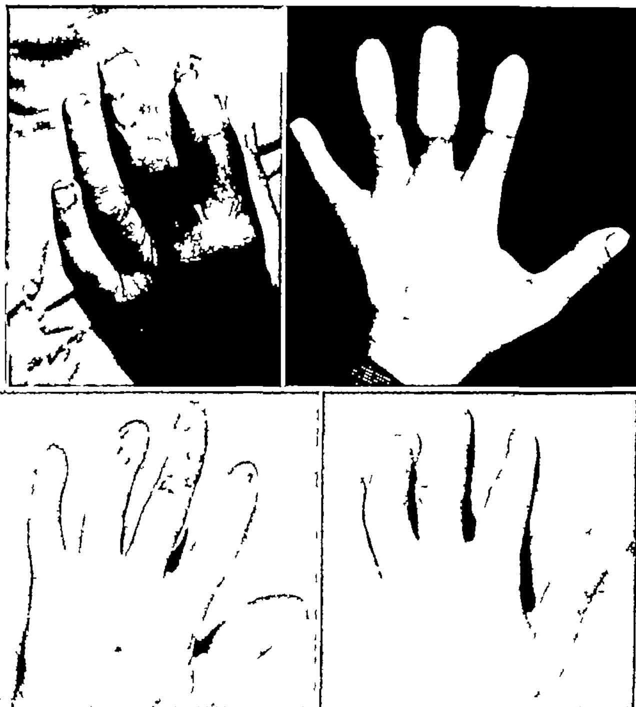


FIG 402 (upper left) Hand of the nurse who held the previous patient in position. She had a severe radiation burn of the index, middle and ring fingers. (Upper right) Abdominal flaps were used to repair the fingers. (Lower left) Left hand of the surgeon who attempted removal of the foreign body under fluoroscopy (Lower right) Postoperative result. A free graft was used for the index finger but flaps were required for the middle and ring fingers About a year later the skin on the dorsum of the little finger broke down and had to be resurfaced

Erreurs et Accidents en Chirurgie Plastique.
ARTHUR JOSEPH BARSKY

L'auteur décrit un certain nombre d'erreurs et d'accidents rares (qui par bonheur il n'a pas eu à se reprocher) que l'on peut rencontrer en chirurgie plastique. La cause la plus habituelle en est la négligence qui ne devrait pas exister en chirurgie puisque les risques inhérents à l'acte opératoire sont amplement suffisants par eux mêmes. Parmi les autres causes il faut signaler un manque de connaissance quand il ne s'agit pas d'ignorance ou la mise en oeuvre de technique discutable ou erronée

L'erreur la plus courante en salle d'opération est

grandes distances à parcourir de nombreux malades n'ont recours à la chirurgie plastique pour la première fois de leur vie qu'à l'âge adulte

Parmi les cas présentés et discutés on note

1 Un exemple probable d'une syphilis avec tuberculose non traitée

2 Quelques exemples de syphilis non traitée

3 Un traitement entamé mais non poursuivi de corps étranger intranasal

4 Un gonflement de la lèvre inférieure non traité depuis de nombreuses années chez un adulte et qui s'est révélé être dû à une tuberculose

5 Un névrome plexiforme non traité

6 Une brûlure de la main datant de l'enfance et qui n'avait pas été traitée depuis 15 ans

7 Des plaies par explosion de poêles à paraffine

8 Une reconstruction du pénis La gangrène s'était installée après une circoncision rituelle En outre un cas d'amputation par le mari d'une femme infidèle

9 Bec de lièvre médian avec absence du prémaxillaire, du vomer et du columel La parole était bonne, seule manquait sur le palais la portion alvéolaire centrale

Über eine Sudafrikanische Einheit fur Plastische Chirurgie. D H WALKER

Der afrikanische Kontinent hat eine Bevolkerung von etwa 160 Mill Seelen Die Sudafrikanische Union enthalt etwa 11 Mill , die große Mehrzahl ist nicht in der Lage, fur chirurgische Maßnahmen zu bezahlen, daher sind die Ambulatorien der offentlichen Krankenhauser sehr beschaftigt, und wegen ihrer Unwissenheit und der großen Entfernungen suchen viele Patienten die Hilfe der plastischen Chirurgie zum ersten Male erst dann auf, wenn sie erwachsen sind

Besprochene und illustrierte Falle schließen ein

1 Wahrscheinlich ein Beispiel unbehandelter Syphilis und Tuberkulose

2 Einige Beispiele unbehandelter Syphilis

3 Angefangene Behandlung—post-nasales Implantat

4 Erwachsene unbehandelte Schwellung unterer Gliedmassen, lange Jahre bestehend, spater als Tbc erkannt

5 Unbehandeltes plexiformes Neuroma

6 Handverbrennung in der Kindheit, 15 Jahre lang unbehandelt

7 Paraffinkochherdexplosion

8 Wiederherstellung des Penis-Gangran nach ritueller Beschneidung und Amputation durch den Mann einer untreuen Ehefrau

9 Mediane Lippenspalte mit fehlender Pramaxilla, Vomer und Columella Sprache gut, am Gaumen nur fehlender mittlerer Alveolarabschnitt

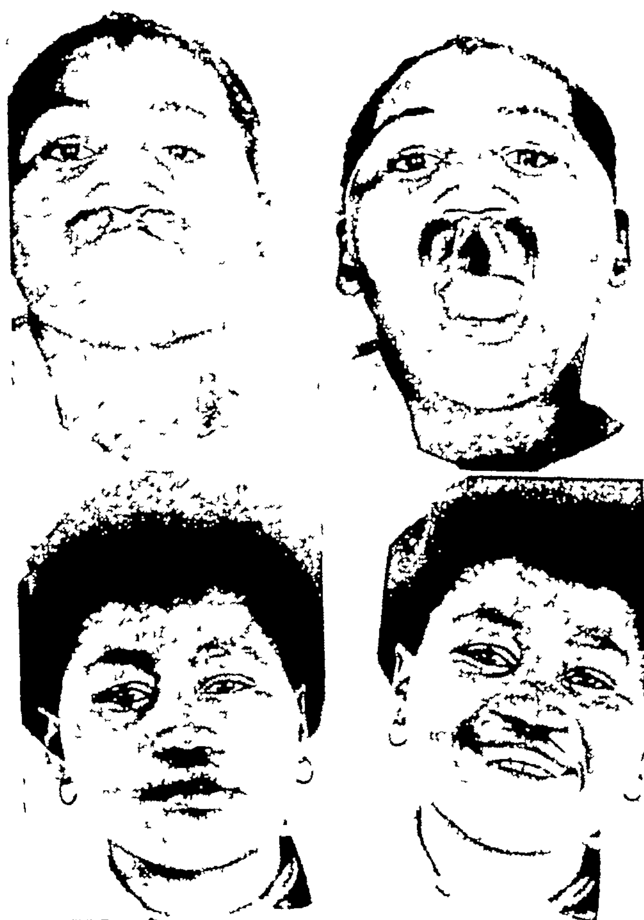


FIG 465

Con Referencia a una Unidad de Cirugía Plástica en Sud Africa. D H WALKER

El continente africano tiene una población de cerca de 160 millones de seres, de los cuales 11 millones corresponden a la Unión Sud Africana La gran mayoría no son capaces económicamente para pagar una operación, los departamentos de pacientes externos de los Hospitales Publicos estan muy ocupados y dada la ignorancia y las grandes distancias, muchos pacientes buscan la ayuda de la cirurgía Plástica por primera vez cuando ya son adultos

Entre los casos ilustrados y discutidos se incluyen

1 Un caso probablemente de sífilis y tuberculosis no tratadas

2 Algunos ejemplos de sífilis no tratada

3 Tratamiento iniciado embutido post-nasal

4 Adulto, protuberancia no tratada del miembro inferior por muchos años que eventualmente se probó era tuberculosis

5 Neuroma plexiforme no tratado

6 Mano quemada en la infancia sin tratamiento por 15 años

7 Explosión de una estufa de parafina

8 Reconstrucción del pene por gangrena despues de la circuncisión ritual y por amputación

9 Fisura labial media con ausencia de premaxilar, vomer y subtabique Buena articulación de la palabra, falta de paladar solo en la parte central de la porción alveolar

of scar extended *in a continuous line* from lips and cheek, across neck and shoulder down arm and forearm on to the fingers

Reconstruction of the penis is an operation we are called upon to perform relatively frequently

The common causes of loss of the penis among African patients are

1 Ritual circumcision at puberty—sometimes by sawing off the foreskin with a sharp stone and rubbing in Cow dung—which may produce a massive spreading gangrene of the penis

2 Multiple strictures and fistulae involving almost the whole urethra with gross irregular destruction of the penile tissue—lesions following untreated venereal infections This may necessitate amputation.

3 Carcinoma of the penis in older patients.

4 Revenge by the husband of an unfaithful wife.

A reconstruction by Mr James Cuthbert was undertaken in the case shown in Fig. 464, top for penile gangrene following ritual circumcision. The level of destruction is easily seen Sir Harold Gillies' method was used A ventral view shows a true ventral seam The amount of penis which had to be reconstructed is clearly shown

Following this I dealt with a man who suffered at the hands of an angry husband and his friends (Fig 464, lower left)

Eventually these patients pass urine with perfect control and freedom from strictures (Fig 464 lower right)

I have recently completed the treatment of a girl aged 16 years who presented with an untreated congenital abnormality (Fig 465 top)

This girl had some of the features of a bilateral harelip but without any premaxilla or prolabium. Her speech was excellent When asked to open her mouth wide one could see that the palate was in the main intact but lacked an anterior central alveolar portion. There was no columella and no vomer

One should be careful in assessing the embryological significance of this case but there seems to be little doubt about the close association of the missing parts.

In repairing this defect one had to try to maintain the normal nasal and lip characteristics of her race.

A skilled prosthetics department is most important in determining final lip contour (Fig 465 bottom)

ACKNOWLEDGMENTS

I should like to acknowledge my thanks to Dr J D Allan, Superintendent of Baragwanath Hospital and to Mr James Cuthbert, Head of the Plastic Surgery Unit of the Johannesburg Group of Hospitals who assisted me in the planning of treatment and selection of these cases

A Propos d un Service de Chirurgie Plastique en Afrique du Sud. D H WALKER

L Afrique a une population d environ 160.000.000 d ames L'Union Sud Africaine en compte 11.000.000 la grande majorité de ces habitants sont incapables de faire face à des dépenses d ordre chirurgical de sorte que les consultations des hôpitaux publics sont très actives en outre à cause de l'ignorance de la population et des

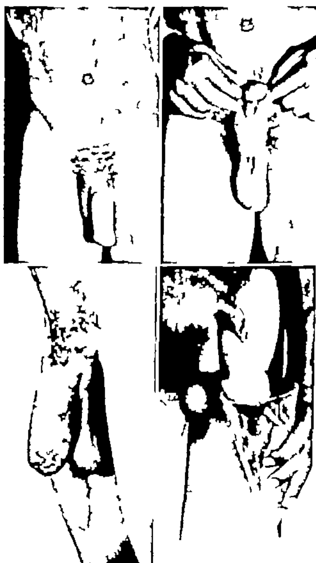


FIG. 464



FIG 467 (upper left) Full thickness soft tissue loss of cheek (Upper right) Full thickness soft tissue loss of upper lip (Lower left) Full thickness soft tissue loss as well as loss of part of maxilla (Lower right) Trismus following sloughing of mucosa

operation gives good results but in males the inner flap will be hairy In females its drawback is the addition of scarring of the cheek and neck

Second method A tube flap is fashioned either from the upper arm and shifted directly on to the face, or from the abdominal wall and shifted to the wrist and later on to the face (Fig 468)

3 *Third type* In correcting bone loss, if only the alveolar margin is lost, this can be easily corrected by a denture If a part of the mandible is lost, usually this is accompanied by full thickness soft tissue loss I always start by correcting the soft tissues and several months later, an osteoperiosteal bone graft from the tibia is used to fill the bony gap

4 *Fourth type* In dealing with these cases of trismus, I differentiate between mild and severe cases For cases with a contracture that is not so marked, I employ a medium thickness graft on a stent But in more marked cases this method fails owing to difficulty of good take and owing to the tendency of the graft to contract, which limits the result by about 50 per cent



FIG 468 Case before and shortly after operation

So in severe cases, the transfer of a flap is essential The inner flap must be stitched well up and back in the angle and it is better to prop the mouth open by a triangular wedge of wood in between the upper and lower molars of the other side until the flap has healed in place or else it will heal in a crumpled position thus hindering the free opening of the mouth

SUMMARY

1 Classification of the types of residual deformities following Cancrum Oris

2 Treatment of different varieties of deformities

REFERENCES

1 McFee, W F Full thickness defects of the cheek involving the angle of the mouth Surg Gynec & Obst, 76 100-105, 1943
2 Davis, W B Some deformities of the face and their correction Surgery, 1 43-55, 1944
3 McIndoe, A H The treatment of old traumatic bony lesions of the face Surg, Gynec & Obst, 64 376, 1937
4 Plastic and Reconstructive Surgery by Earl Calvin Padgett Chapter XXI

Pertes de Substance de la Face a la Suite de Noma. GAMAL EL DINE BEHAIRY

J'ai eu l'occasion d'opérer 24 de ces malades depuis 1943

Type des déformations résiduelles

1 Elevation ou abaissement de la commissure buccale

2 Perte de toute l'épaisseur des parties molles de la joue

Face Defects Following Cancrum Oris.

DR. G E. BEHAIRY, M Ch, Asst. Prof, *Faculty of Medicine,* Chief Surgeon, *Children Hosp, 176 Khidwe Ismail Street, Cairo, Egypt*

Though Cancrum Oris is a rare disease nowa days, yet we still get cases not infrequently in Egypt. Patients who survive this disease are invariably left with a certain degree of deformity varying from a mild to a very severe and ugly one

It is the duty of the plastic surgeon to restore the mental peace of these miserable patients by the aesthetic correction of their ugly deformities

I had the opportunity of operating on twenty four cases of different varieties since 1943 I believe that their importance is not for the correction of a disease that is dying off owing to the development of antibiotics but because the technique applied can be utilised for defects caused by other commoner conditions such as gunshot injuries automobile accidents irradiation sloughs burns and excisions done for malignant diseases, etc.

TYPES OF RESIDUAL DEFORMITIES

1 *First type* The gangrenous process may affect a small patch at the corner of the mouth. When it heals, it leads to a deformity of the angle of the mouth If the affection is above the level of the mouth it pulls the angle upwards and the reverse occurs if the affection is below the level of the mouth (Fig 466)

2 *Second type* The gangrenous process affects the angle of the mouth extending to the lips and cheek causing full thickness soft tissue loss of a small or a big area (Fig 467 top)

3 *Third type* The gangrenous process may affect the underlying bone as well as the soft tissue. In one of my cases the whole maxilla was lost In other cases the mandible suffered loss of a part of its body or half a ramus or even more The necrosis in some of the cases was just restricted to the alveolar ridge of maxilla or mandible with the corresponding teeth (Fig 467 lower left)

4 *Fourth type* The gangrenous process may be restricted to the mucosa causing sloughing off of its major part and its replacement by fibrous tissue. Thus the buccal and labial sulci



FIG. 466 Lowering of angle of mouth

which are essential for the proper function of mastication are obliterated. This group of cases represent themselves as cases of trismus (Fig 467 lower right)

I have had the opportunity of operating on all these different types of cases and have used different methods of plastic correction Of course in every particular case the selection of the exact method is guided by the experience of the operator because it is impossible to lay down strict rules for the correction of each variety

1 *First type* Lowering or elevation of the angle of the mouth is easy to correct by a Z-plasty

2 *Second type* Full thickness defects of the cheek, to be corrected properly must be approached with a clear idea of how much material is needed and the type of material best suited to the repair in order to get the best result from the functional as well as the cosmetic points of view One of the important points is to try as much as possible to take the lining skin from a non hairy area For this variety of deformity I have utilised two methods

First method This operation entails the turning of an inner flap from the external skin of the cheek and crosslapping it with a second flap from the cheek and adjacent neck. This



Fig 467 (upper left) Full thickness soft tissue loss of cheek (Upper right) Full thickness soft tissue loss of upper lip (Lower left) Full thickness soft tissue loss as well as loss of part of maxilla (Lower right) Trismus following sloughing of mucosa

operation gives good results but in males the inner flap will be hairy In females its drawback is the addition of scarring of the cheek and neck

Second method A tube flap is fashioned either from the upper arm and shifted directly on to the face, or from the abdominal wall and shifted to the wrist and later on to the face (Fig 468)

3 *Third type* In correcting bone loss, if only the alveolar margin is lost, this can be easily corrected by a denture If a part of the mandible is lost, usually this is accompanied by full thickness soft tissue loss I always start by correcting the soft tissues and several months later, an osteoperiosteal bone graft from the tibia is used to fill the bony gap

4 *Fourth type* In dealing with these cases of trismus, I differentiate between mild and severe cases For cases with a contracture that is not



Fig 468 Case before and shortly after operation

so marked, I employ a medium thickness graft on a stent But in more marked cases this method fails owing to difficulty of good take and owing to the tendency of the graft to contract, which limits the result by about 50 per cent

So in severe cases, the transfer of a flap is essential The inner flap must be stitched well up and back in the angle and it is better to prop the mouth open by a triangular wedge of wood in between the upper and lower molars of the other side until the flap has healed in place or else it will heal in a crumpled position thus hindering the free opening of the mouth

Summary

1 Classification of the types of residual deformities following Cancrum Oris

2 Treatment of different varieties of deformities

References

1 McFee, W F Full thickness defects of the cheek involving the angle of the mouth Surg Gynec & Obst, 76 100-105, 1943
2 Davis, W B Some deformities of the face and their correction Surgery, 1 43-55, 1944
3 McIndoe, A H The treatment of old traumatic bony lesions of the face Surg, Gynec & Obst, 64 376, 1937
4 Plastic and Reconstructive Surgery by Earl Calvin Padgett Chapter XXI

Pertes de Substance de la Face a la Suite de Noma. Gamal el Dine Behairy

J'ai eu l'occasion d'opérer 24 de ces malades depuis 1943

Type des déformations résiduelles

1 Elevation ou abaissement de la commissure buccale

2 Perte de toute l'épaisseur des parties molles de la joue

Face Defects Following Cancrum Oris.

DR. G E. BEHAIRY, M. Ch , Asst Prof , *Faculty of Medicine*, Chief Surgeon, *Children Hosp , 176 Khidive Ismail Street, Cairo Egypt*

Though Cancrum Oris is a rare disease nowa days yet we still get cases not infrequently in Egypt. *Patients who survive this disease are* invariably left with a certain degree of deformity varying from a mild to a very severe and ugly one

It is the duty of the plastic surgeon to restore the mental peace of these miserable patients by the aesthetic correction of their ugly deformities

I had the opportunity of operating on twenty four cases of different varieties since 1943 I believe that their importance is not for the correction of a disease that is dying off owing to the development of antibiotics but because the technique applied can be utilised for defects caused by other commoner conditions such as gunshot injuries automobile accidents irradiation sloughs burns, and excisions done for malignant diseases etc.

TYPES OF RESIDUAL DEFORMITIES

1 *First type* The gangrenous process may affect a small patch at the corner of the mouth When it heals, it leads to a deformity of the angle *of the mouth. If the affection is* above the level of the mouth it pulls the angle upwards and the reverse occurs if the affection is below the level of the mouth (Fig 466)

2 *Second type* The gangrenous process affects the angle of the mouth extending to the lips and cheek causing full thickness soft tissue loss of a small or a big area (Fig 467 top)

3 *Third type* The gangrenous process may affect the underlying bone as well as the soft tissue. In one of my cases the whole maxilla was lost In other cases the mandible suffered loss of a part of its body or half a ramus or even more The necrosis in some of the cases was just restricted to the alveolar ridge of maxilla or mandible with the corresponding teeth (Fig 467 lower left)

4. *Fourth type* The gangrenous process may be restricted to the mucosa causing sloughing off of its major part and its replacement by fibrous tissue. Thus the buccal and labial sulci



FIG 466 Lowering of angle of mouth

which are essential for the proper function of mastication are obliterated This group of cases represent themselves as cases of trismus (Fig 467 lower right)

I have had the opportunity of operating on all these different types of cases and have used different methods of plastic correction Of course in every particular case the selection of the exact method is guided by the experience of the operator because it is impossible to lay down strict rules for the correction of each variety

1 *First type* Lowering or elevation of the angle of the mouth is easy to correct by a Z-plasty

2. *Second type* Full thickness defects of the cheek, to be corrected properly must be approached with a clear idea of how much material is needed and the type of material best suited to the repair in order to get the best result from the functional as well as the cosmetic points of view One of the important points is to try as much as possible to take the lining skin from a non hairy area. For this variety of deformity I have utilised two methods

First method This operation entails the turning of an inner flap from the external skin of the cheek and crosslapping it with a second flap from the cheek and adjacent neck. This

XIV

MOTION PICTURES

Operation of Facial Paralysis Combining Muscle-Division and Fascia-Transplantation. PER ERIK ASCHAN, DR, *Westend, Helsingfors, Finland*

A permanent facial paralysis can be treated along two completely different lines, either by suturing the n facialis, or, when this is not possible or has been tried without satisfactory result, by a plastic operation using the temporal muscle and strips of fascia lata, as described by Gillies, Passot and others I have used a modification of the latter method This motion picture shows the operation as well as the different stages of one operated case, picked at random, i e the condition before the operation, one month later and a year later, also the final results of two other cases In all these cases the mobility of the mouth is surprisingly good, and the eye can be completely shut

I have used the method in about 30 cases The results have led to the following conclusions

1 The activity of the temporal muscle can be divided into three different functions chewing, shutting the eyelid, and lifting the corner of the mouth, each of which may take place separately

2 Good functional results are only achieved after long and industrious training and therefore depend to a great extent on the energy and intelligence of the patient

3 The best functional results were obtained in men aged between 20 and 40 years In children and older patients the functions of the muscle were not satisfactory Women were also found to be less able to develop these new functions than male patients

4 In all cases, however, the symmetry of the face at rest has been restored or considerably improved If the patient realised the importance of regular training and followed the surgeon's instructions closely, the mobility was also good

Face Defects Following Cancrum Oris. GAMAL EL DINE BEHAIRY, DR, *176, Khedive Ismail Street, Cairo, Egypt*

Three Cases recorded

1 Case of a girl that had full thickness soft tissue loss of the cheek extending from the mouth angle

Operation done Two flaps from the cheek and neck are delayed and later reflected, one as an inner lining and the other one cross-lapped over it Later on the angle of the mouth which was found to be lowered, was elevated by a Z-plasty

2 Case of girl that had also full thickness soft tissue loss of the cheek extending from the angle of the mouth

Operation done A tube graft from the abdominal wall, shifted after three weeks to the wrist and after another three weeks cut from its abdominal attachment, the wrist moved upwards and the tube graft fixed to the face, until it takes its blood supply from the new bed, when its connection to the wrist is cut and the tube fashioned to fill the gap A Z-plasty was needed to straighten the mouth

3 A boy had cancrum nares completely destroying his nose Local flaps from the cheeks and upper lip and forehead, reflected and delayed Later reflected to fashion a nose The defect in the forehead is filled by a full thickness graft from the thigh

3 Perte de partie molle et d os.

4. Perte de muqueuse saine entraînant du trismus.

Correction plastique des différents types

1 Plastie en Z

2 Deux méthodes ont été utilisées

a. Enroulement d un lambeau interne prélevé sur la peau de la joue et croisement de ce lambeau avec un second lambeau prélevé sur la joue et la partie adjacente du cou

b *Greffe tubulée prélevée sur le bras et* l abdomen et glissée jusqu'à la face pour permettre la réparation de la perte de substance

3 Corriger la perte des parties molles et utiliser plusieurs mois après une greffe ostéo-périostée pour combler la perte osseuse

4. Quand ces cas ne sont pas trop graves on les traite par une greffe dermo-épidermique sur stent La greffe pédiculée sera utilisée pour les cas plus sévères

Gesichtsdefekte infolge von noma. Gamal El Dine Behairy

Ich hatte Gelegenheit seit 1913 vierundzwanzig Fälle zu operieren

Typen der entstandenen Deformitäten

1 Verziehen des Mundwinkels nach oben oder unten.

2. Verlust der Weichgewebe der Wange in voller Dicke

3 Verlust von Weichteil—und Knochengewebe

4. Alleiniger Verlust von Schleimhaut und dadurch bedingte Kieferklemme

Plastische Korrekturen der verschiedenen typen

1 Z-Plastik.

2 Zwei Methoden wurden weiterhin angewendet

a Eindrehen eines Hautlappens aus der Wange und Überdecken mit einem den ersten kreuzenden Lappen aus der Wange und den angrenzenden Halspartien

b Ein zum Gesicht transportierter Rund stiellappen vom Arm oder vom Bauch.

3 Deckung der Weichteildefekte und einige Monate später eine Periost Knochentransplantation zum Ersatz des verlorengegangenen Knochens

4 Leichte Fälle werden mit einem Spalthaut lappen unter Verwendung von Stents schwere mit einem gestielten Lappen behandelt.

Defectos de la Cara Despues de Noma Facial. Gamal El Dine Behairy

El autor ha tenido oportunidad de operar 24 casos desde 1913

Tipos de deformidad residual

1 Elevación o descenso del ángulo de la boca.

2 Pérdida de todos los tejidos blandos de la mejilla.

3. Pérdida de tejido blando y óseo

4. Pérdida unicamente de mucosa originando trismus.

Corrección plástica de los diferentes tipos

1 Zetaplastía

2. Se usaron dos métodos

a. Volteo de un colgajo interno de la piel de la mejilla entrecruzandolo con un segundo colgajo tambien de la mejilla y de la porción adyacente de cuello

b Colgajo tubular del brazo o del abdomen transladado hasta alcanzar la cara para reparar el defecto

3 Corrección dela pérdida de tejidos blandos y varios meses despues injerto osteoperióstico para *la pérdida ósea.*

4 En estos casos si la pérdida es pequeña se aplica un injerto de mediano espesor mediante molde y si es severa se repara con colgajo tubulado

XIV

MOTION PICTURES

Operation of Facial Paralysis Combining Muscle-Division and Fascia-Transplantation.

PER ERIK ASCHAN, DR, *Westend, Helsingfors, Finland*

A permanent facial paralysis can be treated along two completely different lines, either by suturing the n facialis, or, when this is not possible or has been tried without satisfactory result, by a plastic operation using the temporal muscle and strips of fascia lata, as described by Gillies, Passot and others I have used a modification of the latter method This motion picture shows the operation as well as the different stages of one operated case, picked at random, i e the condition before the operation, one month later and a year later, also the final results of two other cases In all these cases the mobility of the mouth is surprisingly good, and the eye can be completely shut

I have used the method in about 30 cases The results have led to the following conclusions

1 The activity of the temporal muscle can be divided into three different functions chewing, shutting the eyelid, and lifting the corner of the mouth, each of which may take place separately

2 Good functional results are only achieved after long and industrious training and therefore depend to a great extent on the energy and intelligence of the patient

3 The best functional results were obtained in men aged between 20 and 40 years In children and older patients the functions of the muscle were not satisfactory Women were also found to be less able to develop these new functions than male patients

4 In all cases, however, the symmetry of the face at rest has been restored or considerably improved If the patient realised the importance of regular training and followed the surgeon's instructions closely, the mobility was also good

Face Defects Following Cancrum Oris.

GAMAL EL DINE BEHAIRY, DR, *176, Khedive Ismail Street, Cairo, Egypt*

Three Cases recorded·

1 Case of a girl that had full thickness soft tissue loss of the cheek extending from the mouth angle

Operation done Two flaps from the cheek and neck are delayed and later reflected, one as an inner lining and the other one cross-lapped over it Later on the angle of the mouth which was found to be lowered, was elevated by a Z-plasty

2 Case of girl that had also full thickness soft tissue loss of the cheek extending from the angle of the mouth

Operation done A tube graft from the abdominal wall, shifted after three weeks to the wrist and after another three weeks cut from its abdominal attachment, the wrist moved upwards and the tube graft fixed to the face, until it takes its blood supply from the new bed, when its connection to the wrist is cut and the tube fashioned to fill the gap A Z-plasty was needed to straighten the mouth

3 A boy had cancrum nares completely destroying his nose Local flaps from the cheeks and upper lip and forehead, reflected and delayed Later reflected to fashion a nose The defect in the forehead is filled by a full thickness graft from the thigh

Construction of Auricle. MORTON I. BERSON M D 133 East 58th Street, New York 22, New York, U S A

Film illustrates use of free skin grafts tubed pedicle flaps and cartilage grafts in construction of completely absent auricle.

The Ptosis and Hypertrophy of the Breast. FRANCIS BURIAN, M D, PROFESSOR, *Skrétova 8, Prague XII, Czechoslovakia*

The motion picture will demonstrate periareolar epithelectomy denudation of the gland reduction of the upper and the lower pole of the gland modelation by means of the periareolar dermis fixation to the pectoral fascia

Congenital Anomaly Consisting of Anus Vestibularis with Absence of Vagina and Hematometra. Plastic Repair RAUL CAÑIZARES, DR., *1,502 Vedado, Havana, Cuba*

M. H. 18 years old. Single. White. Puberty at age 12 (External appearance)

Examined for the first time on March 24, 1952, after experiencing during 3 months pelvic pains with radiations to right thigh. Said pain has become greatly intensified since last month accompanied by vomiting The menarche has not appeared and defecation was through the vulva

Clinical Examination

Abdomen A roundish and painful tumefaction was palpable in the hypogastric region

Breast Normally developed

Genitals Vulva was small with pubic hair well developed. Urethra was dilated. Hymen and vagina are entirely lacking there existing instead an anus vestibularis. However there was a blind anus in its normal place

A rectal examination through the anus vestibularis revealed a swelling of the size of a newborn head, which was very painful and corresponded to the uterus. The patient likewise presented congenital anomalies on the upper right limb X ray examination and a posterior abdominal operation revealed the cecum and appendix on left side as well as liver

Plastic operation in two stages

1st Stage Liberation of anus vestibularis and mobilization of rectum with implantation in anal region Exposure of cervix to drain hematometra.

2nd Stage Preparation of a dermo-epidermic graft obtained from the left inside thigh, which was wrapped in a prosthesis especially designed to conform with the vesicorectal space created. Creation of this space up to the cervix, which was fully exposed and placement of the prosthesis with the graft in said place

The result was satisfactory as can be appreciated from the hysterography made afterwards and post-examination of the patient

The Technique of Subtotal Reconstruction of the Ear JOHN MARQUIS CONVERSE, M D, *Plastic Surgery Unit, Dept of Surgery New York University College of Medicine 550 First Avenue, New York N Y, U S A*

The moving picture illustrates the various phases in the technique employed by the author in reconstructive surgery for congenital and traumatic defects of the ear

The Technique of Bone Grafting through the Intra-Oral Route for Contour Restoration of the Face. JOHN MARQUIS CONVERSE, M. D, *Plastic Surgery Unit Dept of Surgery, New York University College of Medicine 550 First Avenue New York, N Y U S A*

The moving picture illustrates the technique of bone grafting for restoration of contour of the mandible through the intra-oral approach.

Surgical Treatment of an Extensive Pigmented Nevus of the Arm. THOMAS DILLON CRONIN M D *6815 Travis St., University Professional Buildings, Houston 25 Texas, U S A*

This motion picture shows a patient with a dark brown, hairy nevus, involving the complete circumference of most of the right arm. The patient also had other smaller pigmented nevi and an associated scoliosis, as not infrequently occurs. The surgical excision of the lesion followed by the application of a dressing to the ex

posed fatty subcutaneous tissues, is demonstrated. As fat offers a poor bed for a skin graft, the skin grafting is delayed one week to permit a fine granulating bed to form over the fat. The technic of adjusting and using the Padgett-Hood dermatome is shown. The postoperative course is followed, including the use of a foam rubber pressure bandage to minimize hypertrophy of scar around the grafts.

Reconstruction of the Lower Jaw. ROBERT ERDÉLYI, M. D., *Zimná 16, Košice, Czechoslovakia*

The colour-film shows the technique of replacement of the lower jaw with a graft from the hip-bone, after an injury by shooting. Immediately after the injury the bone defect was temporarily replaced by a firm rustless wire, the ends of which were inserted into the canales mandibulares. After healing of the soft portions of the chin, the bone is transplanted. As both ends of the graft are wedge-shaped, they are fitted into wedge-shaped incisions in the ends of the mandible. The fixation of the graft is thus perfect, there is no need of any alloplastic material, e.g., wire or catgut, in the fixation. Later the operation inlay is performed for establishment of the lower vestibulum oris for dental prosthesis.

A Case of Reconstruction of Both Eyelids Following Excision for Recurrent Carcinoma. JEAN-BERNARD ESCOFFIER, DR., *8, rue Murillo, Paris (8e), France*

The technic of the operation described on p. 302 is shown: excision and reconstruction.

Result: several weeks and several months later.

Reconstruction of the Face Following Ankylosis of the Temporo-Mandibular Joint. ANDRÉ FARDEAU, DR., *130 Av. Franklin Roosevelt, Brussels, Belgium*

Girl 18. Ankylosis of the right temporo-mandibular joint (at birth) with subsequent malformations of the maxilla and mandible.

1st step. Operation on the joint.

2nd step. Operation on the nose—rhinoplasty.

3rd step. Operation on the mandible—graft.

The principal steps of these reconstructions are shown.

The Surgical Correction of Lymphoedema of the Leg. THOMAS GIBSON, F. R. C. S., *"East Brae," Potterhill Avenue, Paisley, Scotland*

The most satisfactory method of treating idiopathic lymphoedema of the legs, is by radical excision of the oedematous subcutaneous tissue. A technique for accomplishing this expeditiously and in one stage is shown. The skin and subcutaneous tissue of the lower leg and the dorsum of the foot is first excised in one piece. The skin is then removed from the excised mass as a full thickness skin graft and reapplied to the leg. A large pneumatic cuff tourniquet provides haemostasis and the operation can be performed in one to one and a half hours with a minimum of blood loss.

See Gibson T. and Tough J. S. *Brit. J. Plast. Surg.* 7: 195, 1954.

The "Ear Island" Method in the Correction of the Aging Face. MARIO GONZÁLEZ-ULLOA, M. D., AND EDUARDO STEVENS, M. D., *Tuxpan 23 Esq. Baja California, México 7, D. F., Mexico*

After establishing the need of an operation considering the standard of living, work and physiological need of the patient, a detailed method is given for the correction of facial and cervical wrinkles, by means of resection of a continuous skin strip from the frontal, temporal pre-, retro-, and supra-auricular and nape regions.

Ample undermining is performed leaving an island of the ear and galea aponeurotica thus making feasible the radial stretching of the face, neck and nape.

The resection of five compensatory triangles to balance the incisions allows an even stretching and easy cutaneous suture, preventing tension and wrinkling. Two pilot points are applied in order to maintain the tension of the stretched areas, one in the temporal and the other in the mastoid region. This procedure allows a uniform distribution without stretching the sutures.

Biesenberger Technique for the Correction of Pendulous Breasts. HAROLD I. HARRIS, M D, *625 S Bonnie Brae, Los Angeles 57, California, U S A*

The Biesenberger technique is universally known and does not need any special elaboration. The titles are distinct and speak for themselves

Correction of Panniculous Adiposis Abdominalis. HAROLD I HARRIS, M D, *625 So Bonnie Brae, Los Angeles 57, California, U S A*

This film shows the technique for eliminating an unusually large panniculous.

1 Surgical Treatment of Lymphoedema 2. Surgical-Orthopaedic Correction of Mandibular Protrusion. 3 Primary and Secondary Surgical Repair in Cleft Palate. KARL-ERIK HOGEMAN M D ASSOCIATE PROFESSOR, *Allmänna sjukhuset, Malmö, Sweden*

The Denis Browne Technic in Hypospadias. BENGT JOHANSON, M D, ASSOCIATE PROFESSOR, *Karolinska sjukhuset Stockholm Sweden*

Rehabilitation of an Armless Child. HENRY H KESSLER M D *53 Lincoln Park Newark 2, N J, U S A*

This film depicts the rehabilitation of a five-year-old-girl who was born with a congenital absence of both arms at the shoulder The child first received an intensive program of preprosthetic training in her own country Hawaii she also developed the use of her feet for prehensile functions. When she reached a suitable age (five years) she came to the United States Bilateral pectoral cineplasties were performed to enable her to use these special prostheses and when the surgery was completed she was fitted with appropriate prostheses and trained in their use She is now increasing her skill with these artificial arms and the film depicts the various steps in her training program.

The Surgical Treatment of Decubitus Ulcer ROBERT G LANGSTON, DR., *925 West Georgia Street, Vancouver, British Columbia, Canada*

This picture in colour depicts the preparation of the patient and the surgery for a decubitus ulcer in a paraplegic patient made in a centre for the treatment of the paraplegic wounded following World War II It stresses the important principles that lead to a successful result in obtaining a healed and serviceable skin covering over pressure points, particularly of the lower back.

A Functional Study in Cleft Palates, Pre- and Postoperatively X ray Cinematography with an Image Amplifier JOHN LIND M D, ASSOCIATE PROFESSOR, BENGT NYLÉN DR. TORD SKOOG, M D ASSOCIATE PROFESSOR, AND CARL WEGELIUS, M D PROFESSOR, *Akademiska sjukhuset, Uppsala, Sweden*

The motion picture will show typical cases of cleft palates untreated, after closure and after pharyngoplasty

See also paper by Bengt & Nylén M.D

Thumb Reconstruction J WILLIAM LITTLER, M D *16 East Ninetieth Street New York 28 N Y, U S A*

The basic method of choice in a thumb reconstruction is the neurovascular pedicle transfer of an appropriate segment of either the index or ring finger as determined by local conditions and specifically whether the amputation is at the carpal or metacarpophalangeal level

Cases are carefully selected with special emphasis on the requirements of the patient and the presence of anatomic remnants which when reconstructed will provide a thumb with characteristic functional and cosmetic attributes

The movie will demonstrate selection surgical method and functional results.

Rhinophyma. Its Surgical Treatment ERNESTO F MALBEC, DR., *Callao 868 3° B Buenos Aires Argentina*

The author shows different procedures used in treatment of rhinophyma, such as escharifica

tion, superficial and deep decortication followed or not by skin grafting Methods advocated by Dieffenbach, Grattan, Joseph and Sanvenero-Rosselli are also shown

Cleft Lip Repairs. KERWIN M MARCKS, M D , *941 Hamilton Street, Allentown, Pa , U S A*

A diagnostic or cartoon demonstration showing detailed repair of a cleft lip as described in our article "Further Observation in Cleft Lip Repair" which appeared in *Plastic and Reconstructive Surgery 12* 392, 1953 with further modifications of the procedure described originally

Sound X-ray Movies for the Analysis of Cleft Palate Function. ROBERT M McCORMACK, M D , *260 Crittenden Blvd , Rochester 20, New York, U S A*

A sound movie with color photography and x-ray movies of representative types of cleft palate as well as normal patient is presented to illustrate the method for further detailed analysis of speech function in cleft palate

Reconstruction of the Vagina. SIR ARCHIBALD McINDOE, *149, Harley Street, London W 1 , England*

The motion picture will demonstrate the author's technique of the reconstruction of the vagina using free skin grafts

See paper by A McIndoe

Functional Graft of the Heel. LORENZO MIR Y MIR, DR , *Diagonal 331, Barcelona, Spain*

Three cases (one of them bilateral) of reconstruction of the heel following the author's technique are presented

In the technique the author recommends the reconstruction of the heel using a flap (based laterally), taken from the sole of the other foot, as no other teguments are so well prepared for their functional purpose to support and carry the weight of the organism Therefore he calls it "functional graft of the heel "

As donor zone he uses the concave part of the other sole, a functionally "indifferent" (non-sustentacular) zone which does not interfere with the later function of the donor foot

The positional immobilization of the patient which is required during the transfer, is relatively easy and tolerable, and allows the mobilization of both knees so that it is well tolerated even by old people and difficult patients

The Gauze Technique in Skin Grafting. LORENZO MIR Y MIR, DR , *Diagonal 331, Barcelona, Spain*

We present four cases of vascular ulcers of the legs in which we practised skin grafts using the author's own "gauze technique " The technical details of this method can be followed in two of the cases shown

This technique consists of placing a single layer of gauze on the drum of the dermatome before cutting the graft according to the original Padgett technique The graft becomes adherent to the gauze preventing it becoming wrinkled No sutures are needed The draining of the wound is permitted through the single gauze No special preparation is needed

A New Procedure for Fixation of Artificial Ears. MARCEL OMBRÉDANNE, DR , *4 rue Logelbach, Paris, France*

1 *Technique for the operation*—This new device is made up, on the one hand of an artificial ear moulded in supple plastic with appearance and fineness of natural skin, on the other hand of a metallic arch provided with three small balls screwed down, one into its middle, the other two into its ends, which penetrate three small excavations of the artificial ear, an autoplasty is devised for receiving this metallic arch which constitutes the cranial counterpart of the prosthesis

Two skin tubes 3 cm in length are made of total skin taken from the thigh and set up around the orifice of the auditory canal by means of subcutaneous "tunnellization "

Both tubes are devised for prolonging each other but providing between themselves an interval of 1 cm healthy skin, their cutaneous surface is turned to the lumen of the tube, their crude surface is turned to the outside and becomes blended with the surrounding subcutaneous layers

The metallic arch is slipped into the two tubes and fixed in there by the three small balls. The artificial ear clings to the arch by means of the pressure which drives each ball into the excavation intended for it.

The whole device is solid but removable It solves the problem so long raised by the difficulty of holding prosthetic ears.

2 *Presentation of patients operated on.*

Polyethylene in Hypotrophic Breasts. JULIO OTERMIN AGUIRRE, DR., PROFESSOR, *Castelli 195, Buenos Aires, Argentina.*

Motion picture illustrating paper by J O Aguirre.

An Ameloblastic Carcinoma of the Mandible Ulcerated into the Mouth, Treated by Its Resection and Immediate Reconstruction. ELIAS DAMIÃO PIRES, *Av Defensores de Chaves, 58 1º D Lisboa, Portugal*

1 Photographs and radiographs of a white male, twenty three years of age, who was first seen elsewhere with a persistent ulceration which remained after the removal of the right second and third molars

2. Photomicrograph of adamantinocarcinoma (diagnosis proved by biopsy when the patient was referred to us)

3 Roentgenographs of the chest long bones and skull (which revealed no evidence of metastasis)

4. Master cast wax and plaster models

5 Vitallium prosthesis constructed from external and roentgenographic measurements of the patient s mandible

6 Operation, which was performed upon the ulcerated tumor consisted of

a. resection of the horizontal and vertical ramus of the right jaw with disarticulation at the temporo-mandibular joint. (The mandible was cut through in normal bone 1.5 cm anterior to the tumor)

b Closure of the mucosa of the mouth with a continuous suture of atraumatic cat-gut 1-0

c. Insertion of the previously constructed vitallium prosthesis maintained in position by means of three vitallium screws at the anterior end of the mandible

d Chip bone grafts (ilium) placed in the meshes of the prosthesis.

e Closure of the wound in layers.

f Drainage (for four days)

7 Postoperative photographs (taken after one month)

8 Postoperative radiographs (taken after one month)

9 Follow up studies (performed nine months after operation)

a. opening and occlusion of the mouth,

b mastication

c. radiographs

Antethoracic Reconstruction of the Oesophagus. ALLAN RAGNELL, M D., ASSOCIATE PROFESSOR, *Serafimerlasarettet, Stockholm, Sweden*

Demonstrating a technique for antethoracic reconstruction of the oesophagus, in which the thoracic skin tube is covered by means of tube pedicles one acromio-pectoral and one abdominal. The operative technique is shown and four patients are demonstrated eating after the reconstruction. In two of them the thoracic oesophagus had previously been resected by another surgeon for cancer the other two had corrosive strictures of long standing

Reconstruction in Some Cases of Retroposition of the Nasomaxillary Complex. ALLAN RAGNELL, M D ASSOCIATE PROFESSOR, *Serafimerlasarettet, Stockholm Sweden*

In this motion picture there is presented a one-stage method of reconstructing the supporting tissues in retroposition of the nasomaxillary bone complex, by building up the contour with an angulated block bone graft in the nose and bone chips on the anterior surface of the maxilla.

A series of cases with the typical syndrome is demonstrated. Some of these were congenital others the result of central middle-third fractures of pyramid type

The Dermatape Technique of Split Skin Grafting in the Repair of Massive Third Degree Burns by Gasoline Fire. JOHN DAVIES REESE, M D , PROFESSOR, *2037 Locust Street, Philadelphia 3, Pa , U S A.*

Film shows a 12-year-old boy burned with gasoline fire while cleaning household appliance. Film begins before debridement

After debridement the following areas presented third degree burns

1 Entire left buttock, thigh and leg to dorsum of foot

2 Entire right buttock, and posterior of right thigh and leg to middle of calf

3 Posterior surface of left arm

The film shows the details of the Dermatape skin grafting technique Four major procedures were done, the first four weeks after the accident

First operation shows covering the popliteal spaces of both legs and left arm with large skin grafts to avoid the development of scar tissue

At subsequent operations all grafts were of the postage stamp type, an economy procedure because of the paucity of donor skin

Film shows the first dressing after each operation

One year after accident patient was readmitted to hospital for arthrodesis of left ankle joint, which was injured Film shows condition of patient at this time and all donor areas outlined in color

End result 18 months after accident

Uranoplastik. WOLFGANG ROSENTHAL, DR , MED , PROFESSOR, *Robert-Koch Platz 9, Berlin NW 7, Germany*

Within the last 20 years new aspects have been presented with reference to the embryogenesis and the surgical treatment of the congenital malformations of the mouth In former times hare lip and cleft palate were generally registered among the hereditary diseases, nowadays we take exogenous factors more and more into consideration In former times it was thought that only an early surgical treatment of these malformations would lead to good cosmetic and phonetic results Our experiences taught us, however, that this is not true The result of all our endeavors cannot be called a satisfying one, until the exterior appearance of the grown-up patient, who was operated on in his childhood, his dental occlusion, and his language correspond to the norm The most frequently occurring varieties of the congenital cleft palate are represented, and the typical impediments of speech are to be heard The different kinds of operative treatment that the surgeon ought to know are shown Pictures follow of the anatomic result of each operation Its favourable influence on the patient's manner of pronunciation is recorded The plastic operation of a unilateral complete cleft of the palate on a thirteen-year-old boy is shown in detail, for this kind of malformation is the commonest type, and all the technical difficulties of the surgical treatment can be revealed in such a case The motion picture is rounded off with an impressive confrontation of two patients, affected each with the same kind of malformation While the first, the mother, who was never operated on, reveals, besides her cleft palate and cleft velum, the typical impediments of speech, the other patient, her daughter, who was successfully treated, has a regular formation of the palate Her pronunciation is also entirely within the normal range, which is due to the lessons in phonetics she obtained at Thallwitz

Treatment of Severe Nasal Deformity in Secondary Hare Lips. HALFDAN SCHJELDERUP, DR , *Nesttun near Bergen, Norway*

The motion picture will discuss the severe deformities and the main points of the deformity will be emphasized and some end-results demonstrated Then the operation is demonstrated by one case which is seen before, during and after the operation

On the Creation of an Artificial Vagina Using the Sigmoid. HANS HERMANN SCHMID, DR MED , PROFESSOR, *Univ Frauenklinik, Doberanerstr 141, Rostock, Germany*

The motion picture shows the formation of an artificial vagina by the sigmoid with the author's modifications

The most important of these modifications are formation of the artificial channel between the bladder and the rectum, resection of the intestinal loop in a length of fifteen cm without dam-

age to the circulation of the loop, putting the resected sigmoid into the channel under the peritoneal surface in order to avoid a possible peritonitis in the case of disturbance of circulation following gangrene of the excluded loop (up to the present not yet observed), enteroanastomosis at the end of the laparotomy Resection of *the closed hymen and suturing the lower end of* the sigmoid, the artificial vagina to the vulva This method was used in twelve cases In seven cases there was a change in the succession of the single operative acts in these cases the operation begins with the laparotomy and after closure of the abdominal wall the hymen is opened and the channel which has been formed from the laparotomy and in which the excluded loop of the sigmoid has been placed is opened too The lower end of the sigmoid is sutured to the vulva By this succession time can be saved and there is only one change of the patient's position

Operation of Paunch (*Obesitas*) with Preservation of the Navel.

HERBERT SCHRIMPF, DR. MED, DOZENT *Universitats Frauenklinik Rostock, Germany*

Motion picture showing the operation described in the paper by H Schrimpf

Plastic Closure of Large Defects of the Palate.

KARL SCHUCHARDT DR. MED PROFESSOR, *Johnsallee 3 Hamburg 13, Germany*

The film—which was made 15 years ago—shows all the technical details of the plastic closure by means of a tubed flap The author follows the principle of restoring the soft palate in extremely large defects with the available soft tissues of the surroundings, if possible, and of closing the remaining defect of the hard palate with a tubed flap

In the first of the cases shown we are dealing with a war injury Because of scarring the large defect of the hard palate could not be covered with flaps from the surrounding tissues The closure was achieved by means of a tubed flap from the neck and the chest. Simultaneously the nasal mucosa was restored by circumcision and inversion of the remaining palatinal mucous membranes. The flap was introduced through the mouth. The apparatus necessary for securing an opening of the mouth for the fixation and protection of the flap is demonstrated in detail.

In a second case the author shows the use of a flap from the flank transported by the upper arm a method still preferred by him. For the closure of large defects of the palate the flap is introduced through the oral opening. Also in this case special apparatus is used for keeping the mouth open and fixating the flap The relatively small impairment of the food intake in this method is demonstrated in the film.

Dupuytren's Contracture.

MORTIMER W H SHAW, F R. C S, *High Trees, Brownberrie Lane, Horsforth near Leeds, England*

The film shows the radical operation performed upon a commencing third degree contracture in a man of 40 The operation consists of a block dissection of the palmar fascia from the palm and involved finger A method of dressing by plaster slabs is demonstrated which has proved useful in preventing the main complications of haematoma, delayed healing and oedema. Post-operative physiotherapy by paraffin wax baths and active exercises lead to normal use of the hand in six weeks, and return to work in three months.

Dupuytren's Contraction

TORD SKOOG, M D., ASSOCIATE PROFESSOR *Akademiska sjukhuset, Uppsala Sweden*

The surgical treatment of Dupuytren's contraction is demonstrated in a 62 year-old man whose right hand was seriously affected with marked contraction of both ring and little fingers.

The principle of the operative procedure is complete excision of the palmar aponeurosis with its extensions to the fingers using skin incisions which will not cause disabling scarring The great advantage of applying the ingenious Z-plastic flap operation for relaxation of the contracted fingers *according to McIndoe* is well shown. The picture also shows the post-operative result after 3 months

This operative technique has been successfully used in more than 200 cases and was in all ca-

sentials described in *Acta Chir Scand*, vol 96, suppl 139, 1948

Surgical Treatment of Burns. TORD SKOOG, M D, ASSOCIATE PROFESSOR, *Akademiska sjukhuset, Uppsala, Sweden.*

The motion picture illustrates the operative technic in the local treatment of burns used at the Department for Plastic Surgery and Burns in Uppsala

A boy, aged 12, who sustained a deep burn was admitted to the Burns Unit 4 weeks later with a granulating wound extending from the mouth to the umbilicus and from one axillary line to the other Granulation tissues were excised and two days later the entire raw surface was grafted Healing was complete in two weeks.

The technic for cutting and applying skin grafts is demonstrated, as well as a modified dressing for donor areas based on extensive bacteriological and clinical research

The Primary Treatment of Unilateral Cleft Lips. TORD SKOOG, M D, ASSOCIATE PROFESSOR, *Akademiska sjukhuset, Uppsala, Sweden*

The first part of the motion picture demonstrates the operative method described by J B Brown (Blair and Mirault) in a baby with an incomplete unilateral cleft lip

The second part of the picture illustrates the procedure advocated by K Marcks *et al* This operation is performed on a baby with a complete cleft lip and palate The anterior part of the palate and the lip was closed at the first-stage operation

Dupuytren's Contracture. RAOUL TUBIANA, DR, *47, quai des Grands Augustins, Paris (6e), France*

Surgical technique of palmar aponeurosectomy in Dupuytren's contracture

An Effective Burn Treatment. MARIO GONZÁLEZ-ULLOA, M D, *Tuxpan 23 Esq Baja California, México 7, D F, Mexico*

The local treatment of a severe burn is followed from the first dressing to complete recovery The value of antibiotics (terramycin) in combination with modern surgical principles is stressed

Flexor Tendon Repair in the Hand. A R WAKEFIELD, M S (MELB), F R C S, F R A C S, *59 Collins Street, Melbourne, C 1, Victoria, Australia*

The film is in two sections, the first of which is taken in the operating theatre and shows in detail the operation of flexor tendon grafting, while the second part is devoted to demonstrating some results of procedure The last portion shows results in a number of the cases described in the paper submitted on tendon and nerve injuries at the wrist

The Open Method of Burn Therapy. JOHN CALVIN WEETER, M D, *1206 Heyburn Bldg, Louisville, Kentucky, U S. A*

This film was primarily designed as a teaching film for internes, residents, and others interested in the air-exposure method of burn management The film reviews the basic principles of open burn therapy, its proper application and contraindications to its use These points are illustrated by various cases, including a patient sustaining a burn of 62% of his body It shows important details of open technique as applied to facial and body burns, both in hospitalized and out-patient cases The use of the Stryker frame in extensive burns is demonstrated Several grafting techniques are also illustrated, including a section on the semi-open treatment of the donor site The film concludes with a résumé of physiotherapy as applied to the rehabilitation of a patient

INDEX